# ELECTRICAL CONSTRUCTION AND MAINTENANCE

MAY - 1950

## Farm Electrification

Markets and methods for farm wiring modernization.

## **Wired For Production**

Underground primaries, automatic switchgear and flexible secondary distribution in a modern factory building.

## Estimating

How to take-off and list equipment items.

Special Feature

## **Motor Shop Ideas**

Pictorial roundup of practical methods from Boston motor shops, NISA convention hosts in June.

McGRAW-HILL PUBLICATION

## NEW! NEW! NEW! NEW! NEW!



## INTERRUPT 100,000 AMP!



Type EJ-6 fuse rated 250 volts a-c, 30 amperes (actual size)

## 

## ...AND THEY'RE LISTED BY UNDERWRITERS' LABORATORIES

These new General Electric Type EJ-6 current-limiting power fuses are for application on 600-volt a-c (and below) circuits where the short-circuit current may reach 100,000 amperes. You get increased protection when you use EJ-6 fuses.

RATINGS Standard NECS size fuses are available in 30, 60, 100 and 200 ampere sizes in both 250-and 600-volt ratings. All ferrules and blades have silver surfaces to reduce contact losses. Fuses will interrupt 100,000 rms amperes total asymmetrical current including the d-c component of fault current.

FUSE CLIPS The new EJ-6 fuses are designed to fit standard NECS fuse clips. Also available are special-design clips that prevent the insertion of other NECS fuses. Short-circuit stresses cannot jar fuses loose from these clips. Protect your equipment and personnel by allowing only fuses of high interrupting capacity to guard your circuits.

For additional information on these new fuses ask your G-E Sales Representative for a copy of publication GET-1819 or use the handy coupon. Apparatus Dept., General Flectric Co., Schenectady 5, New York.

GENERAL (%) ELECTRIC



MANUFACTURING CORPORATION 1250 ATLANTIC AVENUE . BROOKLYN 16, N. Y.



## ELECTRICAL CONSTRUCTION AND MAINTENANCE

Published for electrical contractors, industrial electricians, engineers, consultants, inspectors and motor shops. Covering engineering, installation, repair, maintenance and management, in the field of electrical construction and maintenance.

## 49th Year - MAY . 1950

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ELECTRICAL INSULATION IS OUR SPECIALTY

- Q. What ONE wire and cable producer grows its own natural rubber, and makes its own synthetic rubber?
- A. UNITED STATES RUBBER COMPANY.
- Q. What ONE wire and cable producer makes plastics?
- A. "U. S."
- Q. What is the most important part of wire and cable?
- A. The insulation.
- Q. Who is best equipped to make wire and cable with superior insulation?
- A. U. S. RUBBER—which grows its own natural rubber, makes its own synthetic rubber, manufactures its own plastics.

Isn't it logical that a rubber company should make the best wire and cable insulation there is? U. S. Rubber has been a pioneer in insulation for over 70 years—has amassed in that time a stockpile of research data and experience that can't be beat. Electrical insulation is a "U. S." specialty!

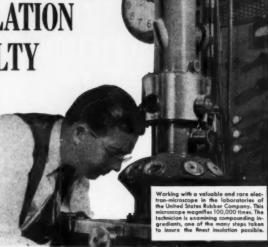
SOME MORE OF THE MANY DIFFERENT VARIETIES OF "U. S." WIRE AND CABLE

UTILITIES: Power Cables • Street Lighting • Royal Cords • Network Cables • Utility Control • Pole & Bracket Cable • Service Entrance • Weatherproof • Zip Cord Pole Fixture Cable • Sup. Control

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**HEAVY INDUSTRY:** Power Cable • Royal Cords • Welding Cables • Control Cables • Machine Tool Wire • Building Wire • Switchboard Wire • Thermostat Cable • Bus Drop Cable

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SERVING THROUGH SCIENCE



Electrical insulation makes the difference between superior and ordinary wire and cable. Conductors of all manufacturers are standard, but insulation must be the best that science can produce. That's why your best bet in wire and cable is U.S. Rubber.

ONE OF MANY SUPERIOR "U. S." WIRE AND CABLE PRODUCTS





Ozone-resistant for high voltage applications in wet or dry locations.

These cables are for use on power distribution, street lighting and station control circuits and for general-purpose wiring on circuits up to 8000 volts between phases and at conductor temperatures up to 75 C. They will not crack after 3 hours in air containing .015 per cent ozone. They are light in weight, easy to install and join, and are resistant to oil, heat, sunlight, flame, acids, alkalis and corrosive chemicals. Uskorona-Neoprene cable also eliminates electrolysis. The following are guaranteed test values:

PHYSICAL AND AGING PROPERTIES (MINIMUM VALUES)

		Uskerena		Neopre	ne Jacket
	Unaged		After 7 Day Geer Oven	Unaged	After 96 Hrs. O.B.
Tensile					
Lbs./Sq. in.	500	450	450	1800	1600
Elongation Per Cent	250	200	200	300	250

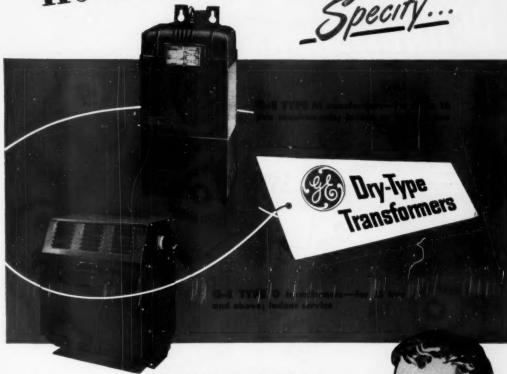
## MOISTURE RESISTANCE (MAXIMUM VALUES)

Dielectric Constant and Power Factor of the insulation after immersion in water at 50 C.: Dielectric Constant, one day is 4.5; per cent gain, 1 to 14 days is 5.0; per cent gain, 7 to 14 days is 2.0; Power Factor, per cent, one day is 3.0; Stability Factor 40-80 volts/mil two weeks, per cent is .5.

UNITED STATES RUBBER COMPANY

ELECTRICAL WIRE & CABLE DEPT. . ROCKEFELLER CENTER, NEW YORK 20, N.Y.

# To <u>Cut Costs</u> on 115 or 230 volt circuits



The right voltage at the right place
will cut wiring costs and line losses. Original cost of the transformers
can soon be made up in savings. General Electric's M
and Ds are completely dependable, easy to install—all standard ratings
available for quick delivery. See your electrical distributor or
get in touch with your G-E Apparatus Sales Office
Apparatus Dept., General Electric Co., Schenectady 5, N. Y.

You can put your confidence in\_

GENERAL



ELECTRIC

ELECTRICAL CONSTRUCTION AND MAINTENANCE . . . MAY, 1950



## Saves installation cost ... PENNIES, TOO

Here's automatic short-circuit and overload protection at a price comparable with ordinary fuse protection. Multi-Breaker Load Center can be wired with breaker or solid mains.

No temptation now to use a penny. With the trouble fixed, just move handle to OFF to reset, then flip to ON. No fuses to bother with.

## Type D Side-Operated Enclosed Switch

Compact design saves space. All parts accessible from front. Plenty of knockouts—solderless wire clamps. 20 to 200 amp. General-purpose and rain-tight enclosures.

Write for catalog on Trumbull equipment for residences, THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, Plainville, Conn.

TRUMBULL T ELECTRIC



TRUMBULL'S TRAINLOAD OF NEW PRODUCTS



## "trigger-start" ballasts

Here is instant starting for standard fluorescent lamps in residential-type fixtures. And it is accomplished merely by using a unique new ballast. With General Electric's revolutionary "trigger-start" ballast, any standard 20-watt lamp or any standard 32-watt Circline lamp starts with a flick of the switch.

These "trigger-start" ballasts are listed by Underwriters Laboratories, are exceptionally quiet in operation, and have the characteristic dependability that has made G-E ballasts "the brand in biggest demand." G-E ballasts make any fixture a better fixture. So, when you're specifying or buying fluorescent fixtures—or replacement ballasts—insist on General Electric "trigger-start" ballasts. Apparatus Department, General Electric Company, Schenectady 5, N. Y.







## SAVES YOU TIME AND MONEY

You need to do no special engineering or planning when you install lighting jobs like this. The entire installation, of 144 floodlights of 1500-watts each, on six 80-foot steel poles, is covered by one of the standard plans in General Electric's "Manual of Floodlighting Plans."

The plans in this manual cover all types of sports from archery ranges and volley ball courts to 22 complete plans for football and baseball fields. They specify everything to assure a complete lighting job—from the exact location of poles to details on wiring.

With these plans, you can handle jobs like Windber even with no previous floodlighting experience. Such jobs should yield a satisfactory initial profit—and frequently carry with them a year-after-year maintenance contract.

For your copy of "Manual of Floodlighting Plans for Sports and Recreation," write for GET-1284C. Apparatus Dept., General Electric Company, Schenectady 5, N. Y. This stadium at Windber, Pennsylvania, is owned by a civic recreational association. Day and night, its facilities are available to all community groups, including the local high schools and industries.



## THE SPORTSLIGHT

This is the floodlight used at Windber Stadium, the G-E Type L-69. It gives more light per unit, more light per watt, is easier to install and cheaper to maintain than any other comparable unit. It's so good that four major-league parks use it, so economical that it's the favorite for sand-lot softball. Bulletin GEC-533 gives complete description and prices.





A GROUNDED 200 hp motor recently put a large press out of commission for a midwest steeltank firm. Dietz Electric, A-C Certified Service Shop, picked up the motor Saturday a.m. The stator was rewound and the motor back on the press in 36 hours - with no lost production time!

ET, FAST, RELIABLE SERVICE like G ET, FAST, RELEASED this wherever your plant is located from your nearest A-C Certified Service Shop. There are 80 of these shops in every major industrial area in the U.S.

These independent shops are handpicked for fine workmanship, high business standards, and excellent facilities. Their work meets factoryestablished standards.

When you need new motors - or matching control - call your nearest A-C Certified Service Shop or Auth-A-3067 orized Dealer.

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Birmingham—Elect. Repair & Serv. Co. Montgomery—Standard Electric Co.

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New Orleans-Industrial Electric Shreveport-Shreveport Arm. & Elec. MAINE

Brower-Stanley J. Leen Company

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more-Kerntone Elec. Co., Inc.

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icksburg-Ludke Electric Company MISSOURI

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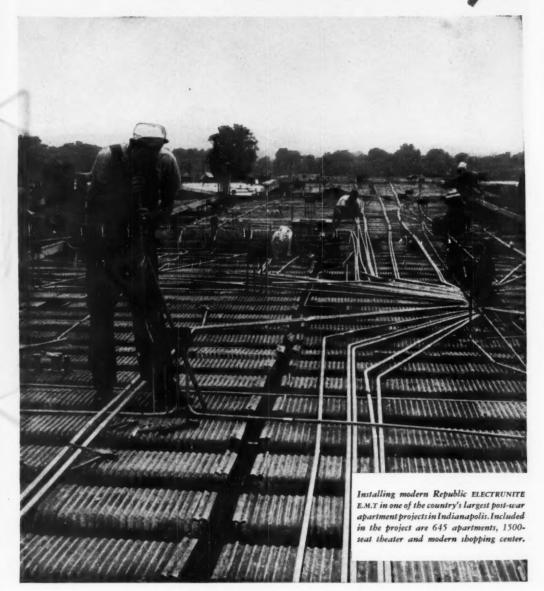
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Why? Because modern Republic ELECTRU-NITE E.M.T. is threadless...light in weight ... easy to bend accurately... to name but three of the better reasons why it is preferred by journeymen electricians.

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With the simple, easy-to-understand ELEC-TRUNITE Bending System, a skilled electrician can make accurate bends, stubs and offsets without difficulty.

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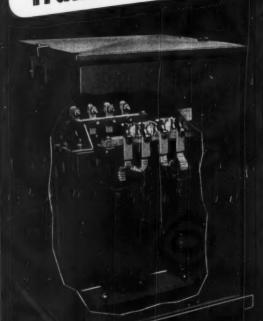


Because modern ELECTRUNITE E.M.T. is threadless, it eliminates completely the need for pipe vise and threading tools. From every standpoint, ELECTRUNITE E.M.T. is the electricians' raceway material.



LIGHTWEIGHT THREADLESS RIGID STEEL RACEWAY

# Cut Waste ALLIS-CHALMERS Dry-Type Transformers





**ELIMINATE** long runs of secondary copper... save through reduced power consumption, improved machine and lighting efficiency, increased system flexibility, lower cable installation costs.

TIME-SAVING solderless connectors are standard on units 15 through 50 kva, single phase, and 37½ through 100 kva, three phase. On larger sizes, flat drilled bars are arranged vertically for any connector.

RAPID THRU-DRAFT ventilation is obtained by air inlet through base and outlet through cover overhang. Natural chimney draft action draws air through vertical air ducts in coils. Class B insulation used throughout.

**BUILT** for hard service. Sturdy side frames retain alignment and rigidity of core and coil structure. Case is all-welded, Spra-Bonderized, receives 3 coats of baked-on resilient paint.

LOOKING FOR WAYS to cut production costs?

Here's a tip — check for below-normal voltages at lamps, motors and heating loads.

Did you know that a 10% correction in voltage will recover a 30% illumination loss? . . . 20% motor starting torque loss? . . . 19% output loss in heating operations?

To side-step these losses and get the most out of your power bill, install Allis-Chalmers "drytypes" right at loads. You'll 1) improve voltage regulation for better lamp, motor, and thermal efficiency; 2) make added savings through reduced line losses.

And they're easy to mount. Put them on overhead platforms, machines, posts or walls. No firewall needed.

Transformers are stocked country-wide in popular ratings. For information and bulletin 61B6382A contact your A-C Dealer or A-C Sales Office.

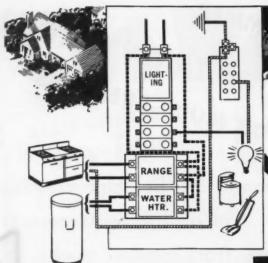
A-3025

ALLIS-CHALMERS, 930A SO. 70 ST. MILWAUKEE, WIS.

## **ALLIS-CHALMERS**









A NEW Reason why the Switch is to

General

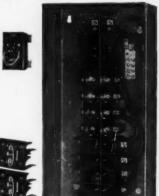
## General Switch Cat. No. 663-108, Main-Range-Water Heater Combination Triple Pullout Unit

100 Amp main lugs feed the 60 Amp pullout switch controlling from 4 to as many as 12 plug fused lighting circuits. The main lugs also feed the Range and Water Heater pullout switches... available in 30 or 60 Amp and non-interchangeable to prevent overfusing. Flush or Surface. Underwriter Laboratories approved.

THE new GENERAL Main-Range-Water Heater Combination
Triple Pullout Unit, the latest addition to the GENERAL SWITCH
extensive line of enclosed switches
and panels, means a real saving in
time and materials, is a neat, compact
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The development of this all-in-one unit is another step forward in the GENERAL SWITCH planned program of product development of "unitized" equipment for simplified electrical systems at lower cost.

Save time and save money... investigate this new unit and Switch to GENERAL today! Available everywhere exclusively through wholesalers.





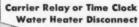
## Separate Meter for Water Heater

Simply remove jumpers and feed the water heater pullout switch through separate meter.

General Switch Corp.

49 Roebling Street Brooklyn 11, N. Y.

SALES OFFICES IN EVERY MAJOR CITY



Remove one jumper and connect water heater switch through disconnect element of meter.

Ask your wholesaler or write today for the GENERAL SWITCH 68-page catalog.



## a hit for your kit!



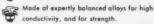
## BURNDY

Here's the handiest split-bolt connector in any workman's kit—the Burndy Servitl Ideal for taps, dead ends, service entrances, motor leads, junction boxes, and ground wire to neutral connections.

For long years of low resistance, troublefree connections, ask your Burndy distributor for Servit!

## **SERVIT**

Servit forces wires into tight contact!



Serrated pressure bar resists crushing and and spot loading.

Withstands overload, vibration and corrosion.

Compact—rounded edges tape easily.

Listed by Underwriters' Laboratories Inc. from No. 10 thru 4/0 AWG.

BURNDY NEW YORK 54, N.Y.

Burndy Canada Ltd., Teronte 8, Ont.; Western Branch: Vernen 58, Cal.

Air-Cooled-Dry-Type

## TRANSFORMERS

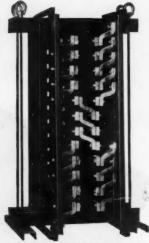
to meet

## Your Exact Requirements Special, Custom Built

for a variety of applications

The designs and parts of SORGEL standard transformers are readily adaptable to a large variety of special transformers, enabling us to furnish quickly and economically Air-Cooled Transformers of most any specifications within our standard size range of 1/4 to 2000 Kv-a.

Special Air-Cooled Transformers can be furnished enclosed in steel cases like our standard types, or without enclosures for panel mounting, or for installation with other equipment. They can also be made portable by being equipped with wheels, or casters, or handles.



115 Kv.e. Special Laboratory Transformer, with Twelve 6-Veit Secondaries of 1600 amperes each, arranged for series or parallel connection.

## For testing, laboratory, beating and many other uses

Tap changing. Voltage boosters. Current regulating. Saturable Reactors.

For years we have been designing and building transformers for a variety of uses. Many have been specially built to meet special requirements.

You have here, at your service, an organization of specialists, both engineers and shopmen, to design and build the special transformers you need.

Your inquiries for special Air-Cooled transformers are welcomed, and will be given our careful and prompt attention.

We also manufacture a standard line of Air-Cooled, dry-type general purpose transformers and unit substations.

Sizes ½ to 2000 Kv-a. Single phase and poly-phase.

Up to 15,000 volts.



Sales Engineers in Principal Cities

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Pioneers in the development and manufacturing of Air-Cooled transformers



PARANITE

PARANITE

WIRES

INSULATED WIRES

AND CABLES—will

Give a Great Performance

POR sixty years Paranite Quality electrical wires, cables, and cords have been manufactured in our Indiana factories. These facillities to serve our trade are strategically located in Jonesboro and Marion, Indiana and are supplemented by warehouse facilities with stock inventories in principal distributing centers. Paranite distributes its many products through wholesale distributors of electrical merchandise.

\* PARA - ("CAOUTCHOUC," TO THE NATIVE) MEANS RUBBER

PARACOTE - Means (Quality Controlled) Building Wire

PARAFLEX -- Means (Quality Controlled) Non-Metallic Sheathed Cable

PARASYN -- Means (Quality Controlled) Type T.W. Thermoplastic Insulated Wire

PARATHERM—Means (Quality Controlled) Type R.H. Heat Resistant Grade Building Wire

PARAUSE—Means (Quality Controlled) Type "RR" Underground Cable (600 Volts)

SPECIFY AND BUY - THESE GREAT NAMES MEAN QUALITY - THEY ARE PARANITE PRODUCTS

IF IT'S PARANITE IT'S RIGHT!

DISTRIBUTED THROUGH WHOLESALERS PARANITE WIRE AND CABLE
Division of ESSEX WIRE CORPORATION
FORT WAYNE 6, INDIANA



EXPORT SALES OFFICE-LIONEL-ESSEX INTERNATIONAL CORPORATION, 15 E. 26th ST., NEW YORK 10, N.Y.

ELECTRICAL WIRES AND CABLES "BETTER THAN CODE REQUIRES"



# ER UP and be prepared!

THAT'S THE CHALLENGE to 9 out of 10 industrial plants—and yours may be one! It's the challenge to prepare those plants to make full use of electric power by modernizing obsolete, worn out wiring systems, by providing adequate wiring capacity now and for the future.

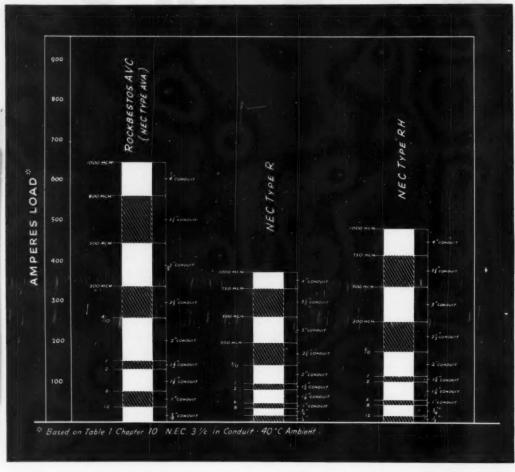
**POWER UP**—And Be Prepared! is Anaconda's new Industrial Wiring Modernization Campaign to help industry make full, efficient use of the electric power it buys... to eliminate costly power waste caused by overloaded circuits, worn out electrical equipment, inefficient distribution and failure to provide for added power loads.

LIKE ANACONDA'S previous industry-wide campaigns,
"Industrial Modernization," "Preventive Maintenance" and "Wire
Ahead," this newest Anaconda program is designed to enlist the engineering
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in helping American industry to POWER UP—And Be Prepared!
Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

ANACONDA Wire and Cable

the job

## Are Electrical Loads Outgrowing Your Conduit?



Here's the fast, inexpensive way to take care of electrical loads that have outgrown their conduits — just replace present cable with Rockbestos A.V.C. . . . with Rockhestos A.V.C. you can increase conduit capacity without increasing conduit size.

Use A.V.C. whenever load growth outruns present wiring. With it you can easily increase capacity without buying and installing larger conduit or fittings. Write today for the booklet "Rx for a Building with Hardening of the Electrical Arteries."

## POCKBESTOS PRODUCTS CORPORATION

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## HIGHER

## CURRENT . . . . VOLTAGE . . . . HORSEPOWER





VOLTAGE	RATED AMPERES	H.P.	STARTER WIDTH
2300	400*	1000*	
up to	and		34"
5000	200*	1500®	1

COMPLETE CONTROL PLUS PROTECTION for your motors in an attractive steel cabinet that is compact and easy to install . . . that's the Allis-Chalmers Type H Starter for motors to 1500 horsepower at 5000 volts.

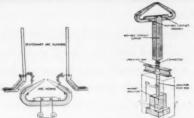
When equipped with air-break contactors these compact starters are 34" wide for full voltage . . . only 38" wide for reduced voltage applications.

You can get Type H Starters for equirel-cage, syn-

You can get Type H Starters for equirrel-cage, synchronous and wound rotor motors — for full or reduced voltage starting . . . for reversing or dynamic braking. For a single starter or an entire control group, check with Allis-Chalmers. Call your nearby A-C representative or send for bulletins 14B6410 and 14B7303.

ALLIS-CHALMERS, 930A SO. 70 ST.

MILWAUKEE, WIS.



DOUBLE BREAK CONTACTS AND STRAIGHT LINE VERTICAL ACTION are combined in Allis-Chalmers Air-Break Contactors to eliminate maintenance factors like flexible contact leads, turning shafts and shaft bearings. These contactors are clean and easy to inspect and maintain . . . accessible in compact attractive Type H Starters.

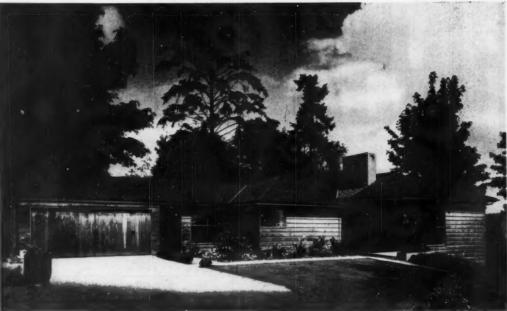




COMPACT, RIGID CONSTRUCTION PLUS NEAT APPEARANCE... Enclosure of heavy gauge steel is welded for rigidity and strength. Heavy parts are supported by framework of steel channels and angles. Full width steel barrier separates low and high voltage compartments. All components are easily accessible behind hinged doors.

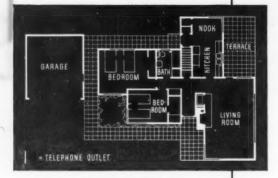
**ALLIS-CHALMERS** 

ELECTRICAL CONSTRUCTION AND MAINTENANCE . . . MAY, 1950



Lloyd Ulrich, Architect

## THE BEST LAID PLANS INCLUDE TELEPHONE RACEWAYS



Concealed telephone wiring is as much a part of modern construction as concealed electric wiring.

Built-in telephone facilities involve little work, little cost. And they mean extra profits for you. A few lengths of pipe, tubing or conduit, built into the walls during construction, will carry telephone wires to the telephone outlets.

Remember – NO ELECTRICAL CONDUIT IS REALLY COMPLETE UNLESS IT CONTAINS RACEWAYS FOR TELEPHONE WIRES.



BELL TELEPHONE SYSTEM



n the files of The Okonite Company are a number of case histories that tell their own story of the long life—the real yardstick of cable economy—that you can count on with Okonite. The two instances cited above are from the records of a single customer.

They are two of eleven instances of cables long used and transferred to new locations by this customer, who has re-installed more than 24 miles of such Okonite cable.

Building true value into cable has been Okonite's business since 1878. What goes into an Okonite cable to make it do a better job...what tests it must pass...what care is taken to control its electrical characteristics—all this and other data are found in Research Bulletin. EC-101. For a copy, address The Okonite Company, Passaic, New Jersey.

THE BEST CABLE IS YOUR BEST POLICY

with today's installation costs only the Longest Lifed

The lifetime cost of a cable rather than its first cost is the only true measure. Okonite wires and cables, built to stand up better and longer, can offset high installation costs.

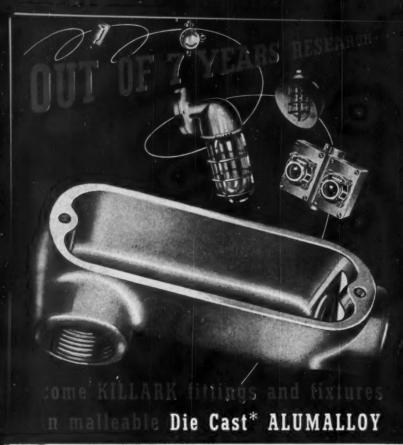


Okonite rubber insulated land-covered underground cable



Okover vernished combric lead-covered sorial power cable.





Die Cast' Alumalloy Fittings and Fix-tures have enough "give" to withstand shock and strain far beyond actual job requirements.



After 10 years' exposure to weather, the iron fitting at left labovel showed deep pitting from rust. The Alumalloy facture right: was scarcely affected, since it is rust-proof clear through—not just on the exposure from the statement of the sta on the surface.

Similar tests between Killark Alumalloy and iron fittings were conducted in chemical plants. The Alumalloy fit-tings showed much less corrosion from the chemical fumes.

## Tested ... Proved 6 ways better

These revolutionary fittings and fixtures climax seven years of intensive metallurgical research. Made of aluminum alloyed with other metals for greater malleability, and die cast under 10,000 lbs. pressure, they offer exceptional advantages in the field-advantages never before attainable.

40% LIGHTER THAN IRON—easier to handle.

HON-CORROSIBLE . . . WEATHERPROOF THROUGHOUT -resistant to chemical corrosion—will not rust.

STRONGER ... MALLEABLE - Alumalloy is not brittle will not break under excessive strain.

SMOOTH, SATIN-LIKE FINISH - inside and out protects fingers and wire insulation.

PRECISE, CLEAN-CUT THREADS simplify installation ... assure a perfect fit for long, trouble-free service.

SAFE ... NON-SPARKING - Alumalloy does away with fire and explosion hazards.

**ELECTROLETS** first with

alumalloy conduit fittings



WRITE FOR INFORMATION ABOUT KILLARK'S NEW ALL-PURPOSE LINE OF DIE CAST" ALUMALLOY FITTINGS AND FIXTURES.

\*Pat. Pending

## RIC MANUFACTURING

Vandeventer and Easton Aves. St. Louis 13, Missouri

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LOS ANGELES DETROIT DALLAS

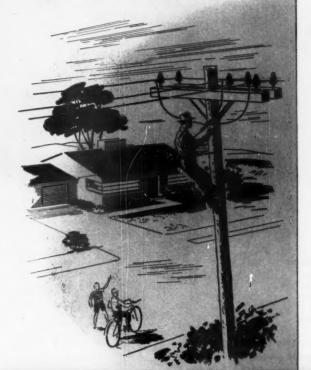
**412 Seaton Street** 8319 Mack Ave. 1901 Griffin Street

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## For service entrance cables with extra dependability...





TO CARRY CURRENT direct from pole to service equipment, there's a Roebling Service Entrance Cable to meet each particular requirement with top dependability and economy... above-ground cables requiring no conduit protection...underground cables with special rubber or armored jackets... a self-supporting drop cable for overhead connection between pole and house.

Each type and style of Roebling Service Entrance Cable is made in the constructions adapted to its own special range of service. From copper wires to outer jackets, all components of these cables are made in Roebling's own plants where modern manufacturing techniques and equipment assure the highest standards of quality.

Have your nearest Roebling distributor help choose the best cable for any given application. John A. Roebling's Sons Company, Trenton 2, New Jersey.



There's a Roebling electrical wire or cable—more than 60 standard types
—for practically every transmission, distribution and service requirement.
Descriptive literature about any or all types will be sent you on request.

## ROEBLING

A CENTURY OF CONFIDENCE

Atlanta, 934 Avan Ava, \*\* Boston, 51 Sleeper St. \*\* Chicago, 5525 W. Roosevelt Road \*\* Chicannati, 3233 Fredonia Ava. \*\* Cleveland, 701 St. Clair Ava., Ft. E. \*\* Denver, 460 Jac. von St. \*\* Bleuston, 6216 Navigation Blvd. \*\* Los Angeles, 216 S. Alameda St. \*\* New York, 19 Rector St. \*\* Philadelphia, 12 S. Twellth St. \*\* Pertland, 1022 N. W. 14th Ava. \*\* San Francisco, 1740 Seventeenth St. \*\* Sentife, 900 First Avenue S.





## Check-these advantages\_

## ECONOMICAL INITIAL COST

Simplified design and construction of the basic chassis, side-panels and reflecta-louver assembly result in production economies which are passed on to the ultimate users.

## LOW INSTALLATION COST

One man, working from the side and not from the bottom, hangs the bare chassis in a minimum of time. Side-panel and reflecta-louver assembly snap into position after the chassis is hung; no tools required. The 8-foot chassis requires less hangers and less installation time.

## MAXIMUM EFFICIENCY

Permaflector Lighting Engineers have designed the Monroe to give efficiencies up to 83 % with 25-35 shielding. Brightness comes well within the I.E.S. recommendations.

## Permaticator REFLECTOR COMPANY ROH 22, PENNSYLVANIA

## SIMPLIFIED MAINTENANCE

Cleaning or relamping is fast and simple. Reflectalouver assembly hinges down from either side; fulllength fibre-plate snaps out quickly for easy access to wiring channel and ballast.

## FLEXIBLE APPLICATION

Plastic, aluminum or steel side-panels . . . reflectorclosures that attach for totally direct lighting . . . and individual or inline installation with or without hangers—make the Monroe the "ideal" unit for many varied applications.

## THESE ADVANTAGES ADD UP TO ALL AROUND LIGHTING ECONOMY!

Write today for complete details on this exceptional series of fluorescent luminaires.

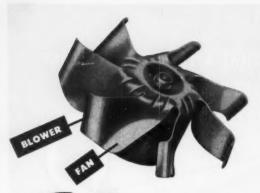
PIT	<b>TSBUR</b> (	SH REI	FLECTOR	COM	PAN	Y
404	Oliver	Bldg.,	Pittsburgh	22,	Pa.	

Please send me your bulletin which describes the Monroe Series in detail and shows specification, photometric and installation details.

Name	 	_
Title	 	_

Company

City\_\_\_\_\_ Zone\_\_\_ State\_\_\_\_\_



## ONLY Bes-Fore HAS THIS PATENTED BLADE

Combining both fan and blower principles, Blo-Fan's exclusive design makes it the only home ventilator which delivers the volume of a fan with the power of a blower...

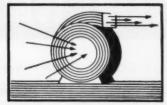
Moving more air—quickly, quietly, with greater efficiency.



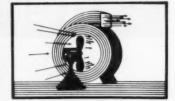
## HERE'S WHY!



Seventy-five per cent of the air moved by a breeze fan is thrown from the blade tips. The center is weak when it meets resistance. A fan delivers volume but lacks power.



A blower draws a smaller amount of air into the wortex, discharging it with great power, thus overcoming resistance. A blower delivers power, but lacks volume.



The Blo-Fan blade is designed so that the fan element feeds the blower element, keeping the vanes fully loaded at all times. That's why Blo-Fan delivers more air with more power.

# 9-SPEED SWITCH WITH MODEL 210 BNO-FAN PROVIDES THREE IMPORTANT BENEFITS: 1 on the speed of an automatile, on the speed of an automatile, quired by degree of air pollution, quired by degree of air pollution, quired by degree of line voltage 3 Minimizes effects of line voltage 1 one of the speed of automatical speed of au

## For offers 4 opportunities for increased profit

Home owners know that Blo-Fan ventilation keeps homes clean—cuts redecorating costs.

Put them where they're needed!



KITCHEN BATH GAMEROOM

When you install Blo-Fan, you make as much profit as you do on 10 to 15 outlets. Cash in with Blo-Fan!

## Spot Ventilation at the Point of Air Pollution



Write for complete details and the name of your distributor PACTORIES: Pomona, California; Newark, New Jersey WAREHOUSES: LOS Angeles, San Francisco, Chicago, Atlanta Stocked by more than 600 distributors in 350 cities. Manufacturers of Pry-Lites—the modern recessed lighting fixtures with snap-on fronts.

\*Trade Mark Rez. PRYNE & CO., INC., BOX E.S, POMONA, CALIFORNIA



This used to be

the coldest room in the house





Frank Adam Electric Co.

ST. LOUIS 13, MISSOUR

Makers of BUSDUCT . PANELBOARDS . SWITCHBOARDS . SERVICE

YOU CAN BE SURE.. IF IT'S
Westinghouse

Tomorrows

Westinghouse

| Life-linestarter

TOMORROW'S STARTER-TODAY!

Uniform Design in NEMA Sizes 0 through 4 .. to 100 hp, 600 volts

## Starter, TODAY!

## New Westinghouse <u>Life-Linestarter</u>\*

FOR BETTER MOTOR PROTECTION ... LOWER OPERATING COSTS

This all-new line of a-c motor starters is announced *only after* 6 years' actual trial service, backed by 40 years of user experience in building motor controls.

## HERE'S WHY it IS tomorrow's starter, TODAY:

- Eliminates Solenoid Friction and Misalignment—Inverted clapper-type magnet balanced on knife-edge.
- Prevents Accidental Opening or Closing of Contacts—Seesaw balance of clapper prevents accidental opening—kickout spring prevents accidental closing.
- Provides Uniform Line—Appearance and construction, NEMA sizes 0 through 4.
- Provides Positive Opening of Contacts— Kickout spring provides force to open contacts.
  - \*Trade Mark

- Provides Straight-through Wiring— Three line leads at top; three load leads at bottom.
- Provides Positive and Precise Overload Protection—Snap action bi-metal DISC instead of "solder pots" or bi-metal strips.
- Permits Front-removal of ALL Parts—No special tools required.
- Corrosion-resistant Parts All Plated— Enclosure Bonderized.
- Meets NEMA Standard Mountings.
- Gives Quietest Operation—Self-aligning magnet construction.

See for yourself. Ask your Westinghouse representative to show you "the inside story"—a Trans-Vision presentation of the Life-Linestarter. Get the facts. Write for 20-page complete line booklet, B-4677. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.





(Model 901) PORTABLE TEST INSTRU-MENTS available in DC, Model 901 and AC, Model 904, single and multiple ranges of wide coverage. Excellent scale readability and shielding. Accuracy within ½ of 104.

2000



SENSITIVE RELAYS a line of sensitive relays including the Model 705 which provides positive control at levels as low as ½ microampere. Non-chattering magnetic contacts handle up to 10 watts at 120 volts.



(Model 622) ULTRA-SENSITIVE INSTRU-MENTS portable DC and AC Thermoinstruments for precision measurement of potentials and minute currents involving electronics, thermo-couples or laboratory research.

## INSTRUMENTS

TO SPEED AND SIMPLIFY ELECTRONIC PRODUCTION AND MAINTENANCE

Illustrated are but a few of the many specialized instruments available from WESTON . . . all designed to simplify and speed-up electrical and electronic installations, production testing, and maintenance. For details, see your local representative, or write Weston Electrical Instrument Corporation, 672 Frelinghuysen Avenue, Newark 5, New Jersey.



ALBANY · ATLANTA · BOSTON · BUFFALO · CHARLOTTE · CHICAGO CINCINNATE · CLEVELAND · DALLAS · DENVER · DETROIT · MOUSTON JACKSONVILLE · KNOXVILLE · LITTLE ROCK · LOS ANGELES JACKSONVILLE · KNOXVILLE · KNOXVILLE · KNOXVILLE · NEW ORLEANS · NEW YORK MERIOEN · MINIMERAPOLIS · NEWARK · NEW ORLEANS · NEW YORK SAN PRANCISCO · SEATTLE · ST. LOUIS · STRACUSE · TUISA · SAN FRANCISCO · SEATTLE · ST. LOUIS · STRACUSE · TUISA IN CAHADA, NORTHERN ELECTRIC CO., LTD., POWERLITE DEVICES, LTD.



(Model 798) MULTI-PURPOSE TUBE-CHECKER offering provision for testing Receiving Tubes — Voltage Regulator Tubes—Light Duty Thyratron Tubes such as 2A4—5D4—884—885—2051. Scale is calibrated "Good-Bad" as well as in mutual conductance range.





PANEL and SWITCHBOARD INSTRU-MENTS a complete line of instruments in all types, sizes and ranges required for switchboard and panel needs . . . including DC, AC power frequencies and radio frequency, rectifier types and D.B. meters.



(Model 697) VOLT-OHM MILLIAM-METER one of a line of packet-size meters, Model 697 combines a selection of AC and DC voltage, DC current, and resistance ranges. Ideal for maintenance testing and many inspection requirements.



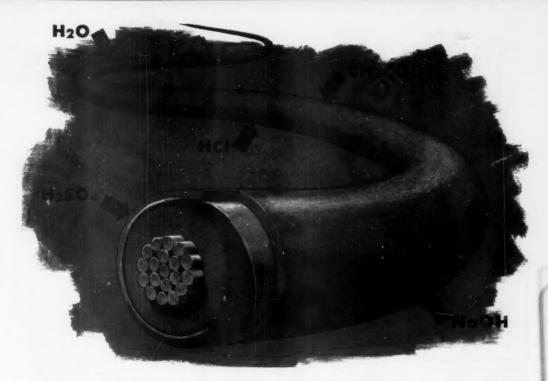
(Model 785) INDUSTRIAL CIRCUIT TISTER a versatile, portable tester for laboratory or maintenance needs, where an ultra-sensitive instrument is required. Provides 27 AC and DC volitage, AC and DC current, and resistance ranges. (DC sensitivity 20,000 ohms per volt.)



(Model 779, Type 1) SUPER-SENSITIVE ANALYZER small, light, compact, 26 range Volt-Ohm-Milliammeter with 5 DC voltage ranges, sensitivity of 1000 or 20,000 ohms per volt. AC temperature compensated. Self-contained power supply. Ideal for many production and test requirements.



(Model 769) ELECTRONIC ANALYZER incorporating a conventional Volinhohm-Milliammeter with self-contained power source—a high-impedance electronic Volf-Ohmmeter using 115 velt, 60 cycle power—a stable, probe-type, Vacuum Tube Voltmeter, for use to 300 megacycles.



## **Troubled with Water and Chemicals?**



 YOUR CHOICE of industrial wire and cable insulated for maximum protection against water and chemicals...should be based on facts!

Wire and cable insulated with VINYLITE Brand Plastics have been tested in the laboratory and in extensive commercial service in many chemical and process plants for over fifteen years. A great deal has been learned by Bakelite engineers cooperating with wire manufacturers, on how to modify VINYLITE Plastics and Resins to provide ever better insulation to meet specific applications.

As a result, numerous formulations of VINYLITE Resins are now available to provide, where called for, better dielectric properties, increased heat re-



sistance, lowered cold temperature flexibility, and stronger resistance to chemical attack by acids, alkalies, oils, water, etc.

If you need wire and cable insulated to withstand unusual conditions, by all means come to Bakelite. We are prepared to analyze your insulation problems on the strength of our long experience, and to furnish you with a list of representative suppliers of wire and cable insulated with the VINYLITE Resins that can meet your specific requirements. Write Department IE-41.

## Light with confidence the proven miller way



Mercury-Mazda for High-Bay



Series-Louver Fluorescent lighting

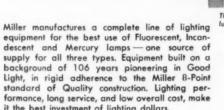


Industrial continuous fluorescent lighting

it the best investment of lighting dollars.

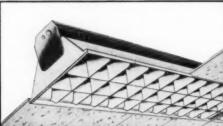


The Diamond Incandescent





RLM Dome Reflector



Fluorescent Troffer Lighting " \*Ceilings Unlimited"



\* Reg. U. S. Pat. Off.

### TRIANGLE You can count on TRIANGL HOT-DIP GALVANIZED

Lasting Protection — Smooth and uniformly hot-dip galvanized inside and outside, Triangle rigid steel conduit is dipped into special lacquer and baked in this endless conveyor equipment. Lour own experience tells you that conduit fails where the galvanizing is thinnest. That's why Triangle's uniformity is important to you. For the severest service, where a single pin-point of penetration could open the way to rapid rust and early failure, users upon users repeatedly specify Triangle conduit. That's why you see more and more "Tristeel" flexible steel conduit, more and more Triangle E.M.T. and rigid steel conduit being used throughout refineries, on bridges over salt water, in increasing numbers of industrial plants. Users'

ewn impartial laboratory tests have repeatedly proved the superiority of Triangle—the conduit that's uniformly hot-dip galvanized...inside and outside...and then further protected by an exclusive new lacquer formulation!

Prove to yourself-in your own laboratory, or on your toughest jobs, that Triangle is the conduit you can count onl



TRIANGLE CONDUIT & CABLE CO., INC.



Catalog No. 500 Gives Full Details Of the Complete "Glazon" & "Trioseal" Building Wire \* "Tricon" Control Wire \*
"Adaptal" General Purpose Wire \* "Triex" Non-Metallic Sheathed Cobie
\* "Triagrane" Transh Cobie \* Service Intrance, Parkway, Power & Varnished Cambric Cobies \* "Tristeel" Flexible, Thin Wall & Rigid Steel Conduit

### Safety Insured!

SAFETY insurance is a must on today's production line. That's why you invest in rigid steel conduit to guard vital electrical controls. You buy lifetime protection against damage by moisture, vapors, dust, vibration, shock and explosion. When you specify Buckeye you specify safety.

### **BUCKEYE CONDUIT**

### THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yolog Steel

CONDUIT - HOT AND COLD FINISHED CARBON AND ALLOY BARS - PIPE AND TUBULAR PRODUCTS - WIRE -

#### General Offices Youngstown 1, Ohio

Export Office-500 Fifth Avenue, New York

ELECTROLYTIC TIN PLATE . COKE TIN PLATE . RODS . SHEETS - PLATES - HAILROAD TRACK SPIKES.

### Wheeler deserves to be HUNG!

panels easily swing n to expose lamps ervicing.

Low surface brightness . . . Indirectly illuminated smooth metal side panels. No vents or perforations. Makes cleaning easier . . . faster!

Here it is — the perfect fixture for Commercial Lighting! This new Wheeler O. C. Slimline unit is the answer for illuminating Offices, Schoolrooms, Stores, Drafting Rooms, Hospitals and Public Buildings. Attractive, economical and efficient.

Made for use with two 75 watt, 96" T12 Slimline lamps and two 40 watt, 48" T12 single pin lamps. Write Wheeler Reflector Company, 275 Congress St., Boston 10, Mass. . . . Also New York, N. Y. Representatives in principal cities.



OCULAR COMFORT

Wheeler REFLECTORS

Distributed Exclusively Through Electrical Wholesalers

MADE BY SPECIALISTS IN



EQUIPMENT SINCE 1881

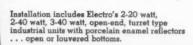
### Modern INDUSTRIAL ILLUMINATION Modern ELECTRO FLUORESCENTS



In working areas requiring shielded lighting, Electro's hinged louver panels were installed on the fixtures.

Electro's industrial fluorescents selected by Florsheim Shoe Company, Inc., for Chicago's most modern factory. Along with Chicago's ten story Allstate Insurance Building...recently completely and entirely Electro-illuminated...this new installation is further proof that Electro's luminaires are setting the pace in modern lighting.

Architects & Engineers: Shaw Metz & Dolio; General Contractor: Campbell-Lowrie-Lautermilch Corp.; Electrical Contractor: Emerson-Comstock Co., Inc.



**ELECTRO MANUFACTURING CORPORATION** 

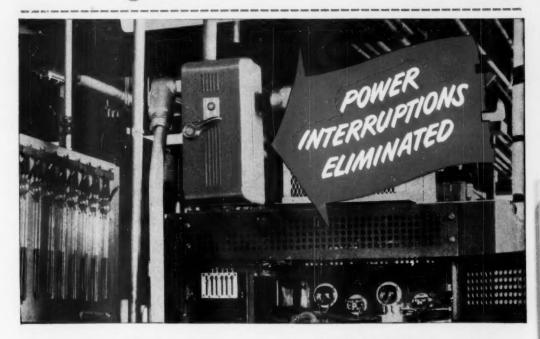


2000 W. Fulton St. . Chicago 12

DISTRIBUTED NATIONALLY THROUGH LEADING ELECTRICAL WHOLESALERS

### YOU CAN BE SURE .. IF IT'S

### Westinghouse



### AB-I Breakers Save up to \$1500.00 Per Year

For a net cost of \$166.00 for five Westinghouse AB-I Circuit Breakers, Raytheon Mfg. Co., Newton, Mass., Radio Receiving Tube Division, reports savings that add up to many thousands of dollars per year.

Mr. Gordon Robertson, Raytheon Plant Engineer, reports that prior to installation of Westinghouse AB-I Breakers on their induction furnaces, they suffered substantial losses from power failure at least once a year. Each power failure, for each machine affected, cost between \$1,000.00 and \$1,500.00, due to loss of material in process and lost time pay.

Since installation of Westinghouse AB-I Breakers, they have eliminated these staggering losses.

This is typical of savings made possible by replacement of ordinary protective devices with Westinghouse AB-I Breakers. They are especially designed to protect insulated conductors from the effects of overcurrent and short circuit

—without the use of fuses. They permit momentary overloads, but trip instantly when a dangerous overload occurs. They permit quick resumption of service when the fault has been removed. Thus, unnecessary work stoppages are prevented, delays in restoring service are reduced.

Westinghouse AB-I Breakers offer special features not obtainable in similar protective devices, in a broad range of sizes and types. Get the facts. See your nearby Westinghouse representative, or write for Bulletin DB-30-230. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.





#### GEORGE'S MARKET, Watertown, Conn.

Engineer: Raymond Mills, Connecticut Light and Power Co., Waterbury.

Electrical Contractor: Walter Greason, Oakville, Conn.

Lighting Equipment, Litecontrol No. 4124, 2-lamp louvered fixture, surface mounted

Lamps: 40 watt, white, fluorescent. Watts per fixture: 100.

Watts per sougre foot: 2.9

Average intensity in service: 50 footcandles.

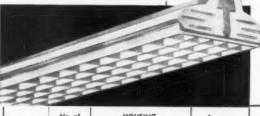
IN ONLY TWO DAYS . . . 16 hours in all . . . three men installed all eighty fixtures in this Connecticut supermarket.

It's not surprising though, for Litecontrol fixtures are designed for faster installation as well as for better lighting results. Their extra sturdiness eliminates sag... makes the contractor's job easier and ensures longer service for the owner. Smart design features speed assembly... speed cleaning and relamping.

Litecontrol engineers are experts in planning better fixtures. Experts, too, in planning installations that display products to best advantage to boost both sales and profits. Why not write today for the Litecontrol catalog ... for help in planning your lighting layouts?

### The LITECONTROL No. 4124 fixture ...

is a shallow unit well suited for stores, offices, etc. Though moderately-priced, it has the smart, graceful lines that ensure good-looking lighting installations. Sturdily constructed, it is electrostatically sprayed with white enamel to give a high reflection factor. Mount it on the ceiling or on pendants, singly or in continuous runs.



	No. of Lamps 2-40W	HOUSING			Approx.
Cet. No. 4124		Length 49"	Width 12"	Height 5¼"	Ship, Weight 33 lbs.
4044	4-40W	49"	16"	514"	44 lbs.

LITECONTROL CORPORATION
36 PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS



LITECONTROL

Fixtures

KEEP UPKEEP DOWN

DESIGNERS, ENGINEERS AND MANUFACTURERS OF FLUORESCENT LIGHTING EQUIPMENT DISTRIBUTED ONLY THROUGH ACCREDITED WHOLESALERS

Next month!

Revolutionary development that will

EOCK the





Federal Electric Products Company, 50 Paris Street, Newark 5, N.J.

ELECTRICAL CONSTRUCTION AND MAINTENANCE . . . MAY, 1950

### How to pull more watts through old pipes with



# gives better service!

### plastic insulated wire saves money

 U·S·S Ampyrol is one of those developments that seems too good to be true. Not only is it a money-saver for rewiring jobs, but Ampyrol's unusual properties put it in a class by itself when it comes to new and original equipment installations.

About rewiring. Ampyrol pays for itself, a dozen times over, when line capacity must be increased. For capacity can often be doubled, without tearing up existing conduit. The savings in rip-out costs alone are usually enough to pay for the entire rewiring job.

And it's not difficult to do. Because the smooth, wax-like surface makes Ampyrol easy to snake. Electrical contractors state that they have more trouble removing the old wire than they do installing Ampyrol.

Acids and alkalies don't bother Ampyrol. Neither do ozone and many commercial solvents. Ampyrol does not support combusion. It's unaffected by sunlight, oil and water. It has excellent aging qualities and remains flexible without cracking.

Ampyrol is available in 12 permanent colors that won't wear off. You can use it for some of the most complex coded wiring and be sure your wiring is permanently coded.

How is Ampyrol different from other plastic wire? It's all in the way we make it. The American Steel & Wire Company has developed special techniques and machinery that means a better, more uniform product. Write for complete information on types and sizes available.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM



Where wiring gets splashed with cut-ting oils, acids, alkalis, grease and cool-ants. No damage results for Ampyrol is impervious to all these agents.



mpyrol Wire and Cable

More Business - More Profit - for Contractors

### NOCRETE

WITHOUT CONCRETE ENCASEMENT

### ORANGEBURG Fibre Conduit News

STANDARI

WITH CONCRETE ENCASEMENT

**MAY 1950** 

VOL. 1 NO. 3

### MORE DESIGN ENGINEERS SPECIFY THIS CONDUIT

### For One and Two-Duct Jobs—NOCRETE



More contractors than ever appreciate the profit possibilities of NOCRETE for single or double duct runs. For when conditions favor its use, NOCRETE—installed without concrete encasement—saves time, work and money—in such installations as factories, schools, colleges, hospitals, drive-in theaters, power, telephone and other communications systems . . . also service entrances, parkway and suburban lighting, airport lighting and communication.

### Easily Tooled on the Job



Orangeburg can be worked right in the field. It is easily tooled and can be sawed to any length. It saves time, makes work lighter for the crew. Contractors save by its use, make better net profit.

#### 57 Years' Record of Success

Orangeburg started in 1893. Its quality and durability are proved. Today it is standard practice for public utilities, municipalities and industry to use Orangeburg Fibre Conduit when installing cables underground. Orangeburg is leader and first choice in every city and state.



#### SO LIGHT A CHILD CAN CARRY IT

Standard 4" weighs only two pounds per foot and even Nocrete with its heavier wall weighs but four pounds per foot in the 4" size. Think what this lighter weight means. It means lower transportation and handling costs, speedier installation.

### ORANGEBURG'S OUTSTANDING ADVANTAGES

These advantages have met with wide acceptance. Each year finds more and more contractors, design engineers, utilities and municipalities turning to Orangeburg for the permanent and economical installation of electrical services underground.

- 1. Will not corrode. Lasts indefinitely.
- Impermeable wall and tight joints prevent corrosive ground waters from entering.
- Lays faster and at lower cost than any other type of conduit.
- Low coefficient of friction keeps pulling tensions on cable to minimum.
- Protects cable sheath from abrasion when pulled in—also from wear during cable movement resulting from alternate expansion and contraction with changing loads.
- 6. Resists acids, alkalis, salt, grease, oil.
- Light, easy to handle and tool on the job.
   Tough, resilient—will not crack or break when properly handled.



### TAPERED SLEEVE JOINTS PREVENT INFILTRATION

...of corrosive ground waters. Easily assembled, with Tapered Sleeve Couplings, these joints are permanently watertight.

### For Multiple Duct Jobs—STANDARD

ORANGEBURG STANDARD — installed with concrete encasement—is the economical construction where duct banks of three or more ducts are involved. In all installations, from single to multiple, Orangeburg lays faster, at lower cost, than any other type of conduit.



NOW BRANDED WITH
ORANGEBURG
TRADEMARK



#### Send for Free Bend Section Folder

Illustrated folder—showing various types of Orangeburg Bend Sections and Angle Couplings—sent FREE on request. Write today to Dept. EC-5, Orangeburg Manufacturing Co., Inc., Orangeburg, N. Y.

ORANGEBURG MANUFACTURING CO., INC., ORANGEBURG, NEW YORK

GraybaR

DISTRIBUTORS, ORANGEBURG FIBRE CONDUIT GENERAL 🚳 ELECTRIC

SUPPLY CORPORATION



### FIBERGLAS James AND LENGTHEN LIFE OF MOTORS

### HELP CUT WEIGHT, ADD POWER,



\*Fiberglas is the trade-mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with glass fibers.

Motors that furnish power for the world's largest lift trucks must deliver peak power when it's needed-without failure!

But constant starting, stopping, reversing, and overloading often lead to overheating, with resultant burned out insulation and motor failure.

That's why the armatures and field coils used in the motors for these powerful hydraulic lifts are insulated with Fiberglas yarns, impregnated with silicone varnish. Because Fiberglas yarn has strength with small diameter, insulation materials made with it help motor makers reduce weight and size of such powerful motors . . . but still retain a safety factor in excess of that obtained from other insulations.

If you want to guard against insulation failure and "down time" in your electrical equipment, specify Fiberglas glass-base insulating materials.



OWENS-CORNING FIBERGLAS CORPORATION, Dept. 856, 16 East 56th St., New York 22, N. Y.

### NON-ELECTRIC DOOR CHIMES

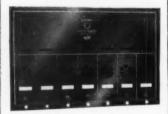
Give EXTRA VALUE!

Choosing the right door chimes can mean savings of thousands of dollars on large scale housing projects — If they're Auth's Parkchester Model Non-Electric Door Chimes. These distinctively modern chimes not only eliminate expensive electrical wiring and accessories, but have such added features as a lookout window through the door for protection of the resident, and a personal name-and-apartment-number plate. Suitable for low or high cost, speculative or investment projects, the Parkchester Door Chime costs little initially, installs easily, and requires no maintenance. It is mounted on the apartment door, and operates by pressing a mechanical push button to sound two musical chime notes. It is a pleasing to the apartment resident as it is economical for the builder.

The Parkchester has been installed on numerous outstanding apartment projects throughout the world . . . including projects totaling 35,000 apartments by three leading developers: Metropolitan Life, New York Life and Equitable Life Companies.

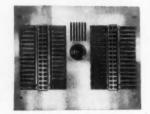
### OTHER AUTH PRODUCTS FOR HOUSING ARE ILLUSTRATED BELOW



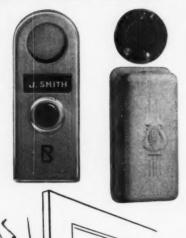


U. S. Approved Apartment House Mail Boxes. Highest quality available, the choice of leading developers. Electrical Bell Systems. Visitor can call apartments and latter can operate vestibule door release.





Apartment Telephone Systems. Provide communication between apartments, vestibule and other points, if desired. Feature loudspeaking, receiverless telephones. A wide choice of systems at reasonable prices.







#### MANUFACTURERS OF

Electrical Signaling, Communication and Protective Equipment for Housing, Hospitals, Schools, Offices, Ships and Industry.



Literature is available describing these and other Auth products and systems.

Complete Systems • One Responsibility

### AUTH ELECTRIC COMPANY, INC. 34-20 45TH ST., LONG ISLAND CITY 1, NEW YORK

### HEINEMANN MAGNETIC CIRCUIT BREAKERS

guard HEINEMANN Circuit Breakers were specified by the firm that designed this building. A. M. KINNEY. INC. Consulting Engineers, Associate Architects CINCINNATI, OHIO Electrical Contractor
THE BELTZHOOVER CO.
CINCINNATI. OHIO



### HEINEMANN ELECTRIC COMPANY

132 PLUM STREET

TRENTON, NEW JERSEY

# Cables run COOLER... in TRANSITE DUCTS



#### How Transite Ducts increase current carrying capacities

Type cable 3 cdr. 500 MCM Compack Sector, 15 KV (6th Edition AEIC Spec.)
No. of cables—3 (all loaded in one bank)
Daity Load Factor—75%

	Transite	Other
Total Therm. Res. to Dielectric Loss (C watts/ft.)	5.66	6.17
Total Therm. Res. to Copper Loss (C watts/ft.)	4.44	4.95
Temp. Rise from Dielectric loss (C)	1.9	2.1
Allowable Rise for Copper loss (C)	59.1	58.9
Allowable Watts per ft. cable	4.44	3.96
Allowable Current-(Amps. per cdr.)	386.	365.
Allowable Current-(Relative %)	105.6	1.00.



... reducing copper losses

... increasing current capacity

... prolonging insulation life

**7**OU REDUCE copper losses . . . increase current carrying capacity ... and prolong insulation life, when you run your cables in Transite\* Ducts.

Current carrying capacities can be increased in a typical duct bank as much as 5%, or 12R losses can be reduced 11%, for cables located in Transite as compared with other ducts used for power circuits.

And, Transite Ducts assure permanent duct banks because Transite is incombustible; is immune to rust and rot; is unaffected by electrolysis; will not slag under action of an arc, and will retain its high original strength.

An unusually smooth bore assures no injury to cable sheath, either in natural movement under load, or when pulling-in cables. Long, lightweight lengths can be quickly and economically installed. In addition, a full line of fittings simplifies even the most complicated of installations.

For full information on Transite Ducts, write for Data Book DS-410. Johns-Manville, Box 290, New York 16, N. Y.



\*Reg. U. S. Pat. Off.

Johns-Manville Transite Ducts

TRANSITE KORDUCTfor installation in concrete

TRANSITE CONDUITfor exposed work and installation underground without a concrete encasement

### CRESCENT



Has These Improved Features Which Make Installation EASIER—OUICKER—SAFER

Bond Strip Under Armor

Permanently low armor resistance is provided in sizes No. 14 and 12 AWG by use of a flattened, bonding wire which is in contact with the under side of each convolution.



FILE OR SAW





PULL OUT PAPER



INSERT BUSHING

Prefabricated Break Lines

The Cut Mark (at 1½" intervals) shows the location of a prefabricated breaking line inside the armor. Only a few strokes of a file or saw guided by the Cut Mark are required to cut through one outer ridge, and a bend by hand severs the armor. This results in a clean separation with no sharp edge—a safer, easier and faster job. The prefabricated breaking lines are so designed that there is no reduction in tensile strength, bending quality, crushing resistance and electrical conductivity of

In the last 20 years alone, over SIX BILLION FEET of Armored Cable have been produced by the industry. Armored Cable provides the only general purpose, factory-assembled and tested, metal protected wiring system.



CRESCENT WIRE & CABLE



CRESCENT INSULATED WIRE & CABLE CO.

TRENTON, N. J.

### You can't buy Better Fittings

or ones that cost less to use



Cross Section Showing

Quicker to use and neater in appearance, Briegel All-Steel Indenter Fittings not only make stronger connections but also make each job more profitable to the contractor and satisfactory to his customers.

Two Easy Squeezes and they're set to stay. It is only natural that the Briegel All-Steel Indenter Fittings are the most widely used E.M.T. connectors and couplings. Contractors the world over recognize their cost cutting qualities and the fact that they make each wiring job neater, stronger and better.



All B-M Fittings Carry the Underwriters Seal of Approval



BRIEGEL METHOD TOOL CO.

#### DISTRIBUTED BY

The M. B. Austin Co., Northbrook, ill.; Clayton Mark & Co., Evanston, Ill.; Clifton Conduit Co., Jersey City, N. J.; General Electric Co., Bridgeport, Conn.; The Steelduct Co., Youngstown, Ohio; Enameled Metals, Pittsburgh, Penn.; Kondu Mfg. Co., ktd., Preston, Ont.



### PAH!... Another New Idea

Resistance to new ideas is the exception in the electrical business. The whole personality of the industry-the thing that made it grow 5000% in 45 years—is one of experiment, development and progress.

Look what's happening today in the field of insulated wire and cable, for instance. Growth-minded contractors are using more and more aluminum for feeders and other large cable installations.

Why? Simply because aluminum costs less. Weighs less. Puts less strain on a building.

By using a little initiative, these con-

tractors are getting credit for a good job at a lower price.

Do this yourself today: Figure one good feeder installation both wavs-in aluminum and in copper. You'll see some very interesting savings.

For names of manufacturers and copy of "Questions and Answers About Alcoa E. C. Aluminum", call your nearby Alcoa Sales Office, or write ALUMINUM COMPANY OF AMERICA, 1785E Gulf Building, Pittsburgh 19, Pennsylvania.



### Insulated Aluminum Conductors

of ALCOA ALUMINUM are made by leading manufacturers

Slower Speeds to fit Your Needs



### Now available in ratings down to 20 horsepower

Where "slower than motor" speeds are required — on agitators, conveyors, scrapers, or in a host of other applications—you can obtain positive reduction with the right power by using Wagner Gear Motors.

These gear motors combine famous Wagner motor dependability with nationally-known gear units to give you compact, efficient gear motors that can help reduce costs, improve your product, and increase your plant operating efficiency by eliminating the need-for belts, pulleys or chains.

The expanded Wagner line of gear motors now includes ratings from 1/20 to 50 horsepower and with gear ratios to meet every requirement. Their flexibility of mounting provides an exceptionally large number of combinations to meet particular needs.

Twenty-nine branches, located in principal cities, and manned by trained field engineers, are at your service. Write for information on the complete line of Wagner Gear Motors.

WAGNER ELECTRIC CORPORATION 6413 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS - TRANSFORMERS - INDUSTRIAL BRAKES AUTOMOTIVE BRAKE SYSTEMS - AIR AND HYDRAULIC

BRANCHES IN 29 PRINCIPAL CITIES





That's about it when Electric Feedrail, the modern, totally enclosed, electrical distribution system is used.

One vertical cable connected to an overhead trolley, through an Ever-Lok trouble-proof connector—no wires to trip over, snag or tangle, no exposed circuits—and you can move the equipment along the line without disconnecting.

Feedrail is also ideal for cranes and hoists, moving test lines, and lighting. In fact, anywhere electrical equipment moves.

You can save wiring costs, maintenance time, speed up your, plant, and make it electrically safe at the same time.

Ask for technical data and bulletins applying to your specific applications.

Lighting

Bench Work

Moving

Machines

25-A

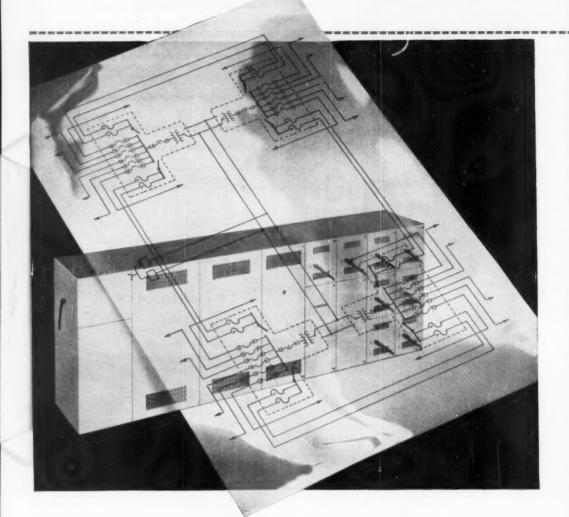
FEEDRAIL

### FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

125 BARCLAY STREET . NEW YORK 7, N.Y.

### You can be SURE.. IF IT'S Westinghouse



#### PRIMARY SELECTIVE NETWORK SYSTEM

This modern distribution system provides maximum flexibility to meet changing load conditions. It provides very reliable service with very good regulation and efficiency. By sacrificing these characteristics to some degree it is possible to use other systems whose initial investment is less. To evaluate the system most desirable for your plant, consult your Westinghouse Representative.



### Visualize

### your power problem this way

Any old way of running wires to your equipment may work...but what about efficient, profitable operation?

A modern electrical distribution system can make electrical power do more of your kind of work. But again, just any of the modern systems won't do, because there is no all-purpose system to balance all factors. That's why it's imperative that your system be planned to meet your specific needs.

Power centers provide the simplest way—the lowcost way—of attaining the system you require.

Westinghouse Indoor Dry-Type Power Centers give you these advantages:

THEY'RE MORE ECONOMICAL—because they eliminate the need for costly vaults and can be located near center of load...resulting in shorter secondaries, lower line losses, better regulation.

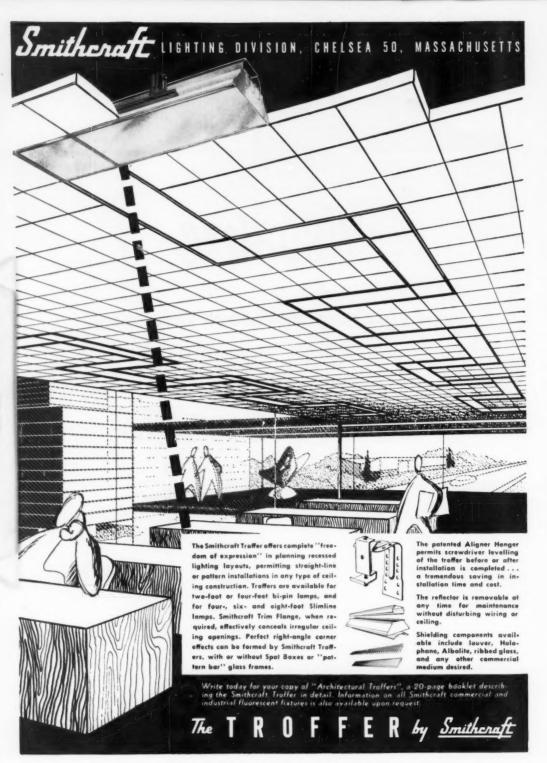
THEY COST LESS TO MAINTAIN—no liquids to test, recondition or replace . . . no gaskets, valves or gauges. All parts are readily accessible.

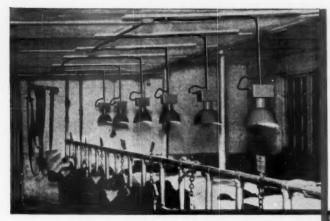
THEY'RE SAFER—fire and explosion-proof, they have no exposed live parts. Each breaker is enclosed in an individual compartment. Positive interlocking prevents false breaker operation,

Your Westinghouse Representative will be glad to discuss your system problems with you. He is prepared to offer complete system information, with advantages of each carefully weighed.

Ask him for Booklet B-4045, "Industrial Power Distribution Systems" and B-4162, "Power Centers by Westinghouse". Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.







IN THE BARN . . .

### You can depend on neoprene-jacketed cable for resistance to rot and weather

In the barn, neoprene-jacketed cable resists deterioration from condensed moisture, acid and fungus—won't propagate flame. Outside, neoprene withstands sunlight, heat, cold, weathering and aging when used as aerial cable...crushing, corrosion, rot and abrasion when buried underground.

So next job, make sure you use cable that's designed for long, trouble-free service—with a jacket of Du Pont neoprene. Although Du Pont does not make neoprene products, leading wire and cable manufacturers use neoprene for their quality constructions. Your distributor can supply you. And if you'd like to read about new neoprene applications that may help you, we'll gladly put you on our mailing list for "The Neoprene Notebook." Write: E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division T-5, Wilmington 98, Delaware.



.. OR UNDER THE BARNYARD



are in Du Pont "Cavalcade of America"—Tuesday
evenings NBC—coast to coast

### G.E.'S 9574 ALL-PURPOSE\* INSULATING VARNISH

## is tops!



J. L. Hughes

How do users like General Electric's new all-purpose insulating varnish G-E 9574?

Here's a statement from J. L. Hughes, owner of the J. L. Hughes Electric Company, Columbus, Ohio.

"We have found from test and practical experience that General Electric general-purpose varnish 9574 is tops for our work."

Mr. Hughes knows what he is talking about. He has been in the business of motor repair and rewinding in Columbus for thirty-three years.

### YES, G-E 9574 OFFERS YOU

CONTRACTOR OF THE PROPERTY OF

One varnish you can depend on for ALL\* jobs.

**A Combination** of electrical, chemical and mechanical properties formerly found only in special-purpose varnishes.

Easier Handling: Low baking temperature; deep penetration; simple thinning with petroleum spirits.

\*G-E 9574 gives excellent results on all types of coils except extra-high-speed armatures. It is one of G. E.'s complete line of electrical insulating materials, including adhesives, wedges, coments, compounds, cords and twines, sleeving, wire enamels, mica, papers and fibers, permafils, tapes, tubing, varnished cloths, and varnishes.

APPROPRIATE AND SELECT PARTY.



SEND FOR BULLETINI If you haven't yet tried G-E 9574, get in touch with your local G-E Distributor, or write for our new bulletin to Section K1. Chemical Department, General Electric Company, Pittsfield, Massachusetts.

You can put your confidence in

GENERAL 🍪 ELECTRI



### REASONS WHY

**G & W Capnut Terminal Potheads** 

**GIVE YOU** 

### TROUBLE-FREE SERVICE

Interchangeable aerial lug clamps through thin wall hoodnut to permanently lock assembly against vibration. Electrical contact is made on both sides of 'V' of threads.

2 "Resistoyl" gasket hermetically seals top of porcelain. Gasket and threaded connector are covered by capnut.

Connector ears bear on porcelain shoulders, and slots in porcelain engage connector fins to hold assembly while capnut is screwed on.

Porcelain is designed with large bore and thick walls to provide extra safety factor.

Bodies are properly sized forbest electrical characteristics and easy installation without injury to cable.

6 "Resistoyl" gasket under bottom petticoat of porceiain has an extension into body opening to prevent it from squeezing out when compressed. Cement holds gasket in compression for permanent tightness.

7 Lid and body flanges are machined to provide smooth parallel gasket surfaces for permanent tightness.

Lid flange is extra thick to prevent bowing when capscrews are tightened.

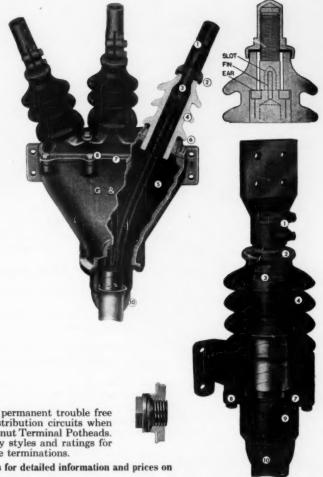
Gasket flanged pipe plugs provide permanent seal for filling holes.

Wiping sleeve (or optional stuffing box) cable entrance provides permanent seal at bottom of pothead.

Add these features and you get permanent trouble free operation of your high voltage distribution circuits when cables are terminated in G & W Capnut Terminal Potheads.

G & W makes potheads in many styles and ratings for single and multiple conductor cable terminations.

Ask our representatives or write us for detailed information and prices on your cable terminating requirements.





ELECTRIC SPECIALTY COMPANY.

Representatives in principal cities. In Canada, Powerlite Devices, Ltd., Toronto



necessary?

### Some "Moral Insurance" here might have avoided a serious accident

Workmen's compensation is a fine thing-but it can't replace a mangled arm.

Safety laws prevent many accidents—but they can't cover every hazard of an individual plant.

Accident prevention which goes beyond the law is an unwritten responsibility of every employer. It is his "Moral Insurance" for his employees welfare.

The premiums for "Moral Insurance" are not high. They do not have to be paid for in fancy safety gadgets. Their cost is simply the institution of common sense safety regulations covering all local hazards—enforced by employee committees with the full support of management.

Yes-"plant safety" is a mutual job.

DON'T FORGET-THE LIFE YOU SAVE MAY BE YOUR OWN

Published in the public Interest by:



### McGRAW-HILL PUBLICATIONS



WEATHER FORECAST

SALES FORECAST

fair and warmer

Get set now...for cooling season sales



#### MAKE EXTRA PROFIT WITH SANGAMO TIMERS

ideal for attic, window, and ventilating fan control!

Here's a "natural" for cooling season sales...tie in a Sangamo Interval Timer with every attic, window, or ventilating fan installation you make. Sell your customers freedom from the bother of turning units off manually—from the needless expense of letting units run all night—sell them the economical convenience of automatic control!

Easy-to-sell Sangamo Timers are designed and built by experts in automatic time control...are fully guaranteed ... and they're priced right, too!

Catalog No. 1010A gives full information.



Small in Size ... but BIG in Quality

Sangamo Interval Timers offer high accuracy at low cost. They provide an automatic OFF operation following an elapsed ON interval which is manually present for each operation. The unusually quiet, low-speed motor operates only after the manual setting has been

made. The operating range covers any period from 15 minutes to 12 hours.

The Type T Timer, for wired-in construction, may be either well or switch box mounted, and is rated at 15 emperes A. C.

#### Type TJ Portable Timer

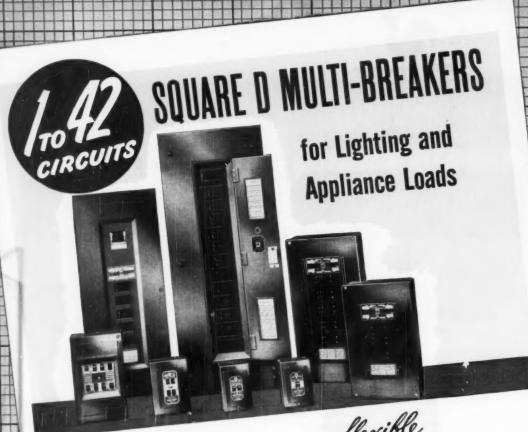
Jangame also offers a persual timer with a 4 feet plug-in cent and bylit-in neoptacle for persuals service on the service of t



### SANGAMO

ELECTRIC COMPANY SPRINGFIELD, ILLINOIS





Coilless

THERMAL- A MAGNETIC. Thermal element deflects in proportion to temperature of wire insulation resulting from both surrounding air and losses within the conductor. Magnetic element responds instantly to heavy overloads or shorts. Both are needed for complete protection.

REPEAT PROTECTION. Nothing burns out . . . nothing to replace. No live parts are exposed. Anyone can quickly restore service.

NON-TAMPERABLE. Factory test-tripped and sealed. Eliminates well-intentioned but dangerous "doctoring"

to accommodate higher loads. SWITCHING. Circuits can be manually switched "ON" or "OFF" in addition to the automatic "TRIP" and manual "RESET" protective functions.

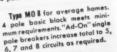
CONVENIENCE. Multi-breakers are attractive and occupy very little space. Mount them in any location. Provide for future expansion.

Write for Bulletin SA590. Square D Company, 6060 Rivard Street, Detroit 11, Michigan.

flexible

Basic multi-breaker mechanism lends itself to either single or multi-pole construction.

Types MO 1, MO 2 and MO 4 for branch circuits and small homes where high volume and low cost are controlling factors. Similar parts are assembled in 1, 2 and 4 pole blocks.



Types MO 12 and MO 26 for larger homes. "Plug-in" 2 or 4 pole breakers cover the range of 4 to 20 circuits.

MO Panelettes and NMO Panelbeards extend range to 42 circuits for stores, institutions, buildings and factories.









LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO . SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

### .... at a Glance

### Apparatus Train

The biggest electrical display kit ever built is beginning a year long trek over the country to display and demonstrate modern methods and apparatus for the production, distribution and industrial utilization of electric energy. It is General Electric's More Power to America Special, a quarter mile long, 10 car silver streamliner packed with exhibits of more than 2000 of the most modern electric products, systems and techniques.

Believed to be unique in industrial marketing history, the display will visit 150 key industrial centers this year and next, and is, according to company executives, "a creative and original response to one of the major economic challenges of our times", the stimulation of industrial modernization.

Selling the electrical idea sells more than electrical apparatus. It sets off a chain reaction of sales that activate many segments of industry. "You bring new business to the electric utility, to the machinery manufacturer, to the supplier of materials and components to the consulting engineer, to the electrical contractor, to the railroads and other transportation agencies. And, best of all, when you sell an electrical idea, you are bringing your customer the means to better business health."

### The Farm Job Ahead

From the "lights" of the first electrical energy connection to the considered economic advantages of full electrical utilization on the farm is a major step in wiring design. The first stage of rural electrification, the enormous task of connecting farms to central station power is well advanced. Modern application of electric power to the process of farming is just beginning. This second stage of rural electrification is the framework of a study and review of farm wiring as a field of modernization which begins on page 76 in this issue. Brought together by Middlewest Editor Gus Eckel, the data presented is factual and up-to-date. It explores

the problem and the prospects of the the field and should provide useful guidance to all interested in this growing market for the electrical contractors services.

### Boston Shops

Next month Boston motor shops will be hosts to the annual convention of the National Industrial Service Association. Boston is the hub of a million dollar motor repair market, as we figure it roughly, served by a group of progressive service organizations. For those who will go to Boston for the meeting, we offer here a quick preview of some of the ingenious and practical ideas they will find if they go calling on local shops. For those who won't be there, there are useful methods being applied successfully and deserving of close study.

Just the sheer mechanics of digging up a large number of practical methods from all these shops required considerable planning and preparation. Hugh Scott did the job with the valuable help of Jack Reddington and other members of the convention committee, plus the thorough cooperation of the management and personnel of all the shops visited. "Motor Shop Ideas in Boston", on page 70, is the result of the project.

#### Critical Year

Watch summer air conditioning this year. We are heading into the first real test of the buyers market across the board in all kinds of merchandising and services. Can non-air-conditioned shops meet the competition, not only the Avenue exclusives downtown but right out to the neighborhood supermarket? This summer may provide an answer, even a possible snow-balling of air-conditioning sales. Further air conditioning in the home has hardly been touched, although efficient and highly effective equipment is available at moderate prices. The effect on wiring systems of any gain in air conditioning installation is immediate. Even the smallest window units take practically the

full capacity of a 15 amp. circuit and larger installations may require additional wiring all the way back to the service.

### Quality Pays

Why rewind to superior specifications? Do quality and guarantees on
repair work actually pay? At New
England Machine and Electric Company they do, in plus business. Careful analysis has shown that modern
equipment, practical quality shop and
field repair methods, trained organization and an unconditional guarantee are four vital factors in promoting
plus business. Superintendent Hector
Munro discusses some of the considerations as to why guaranteed work
pays and how it is done in "Quality
Rewinds Pay." on page 74.

### Care of Production Wiring

Underground electrical distribution, with tunnel bus feeding floor trench branch circuits, automatic switchgear, and planned lighting are high spots of the electrical design of Perfection Stove Company's new Cleveland plant. The system was installed by Parker Electric Company and provides a notable case study in modern industrial wiring design. "Wired for Production," by Plant Engineer A. D. Buschmann, opens our editorial feature section this month on page 67.

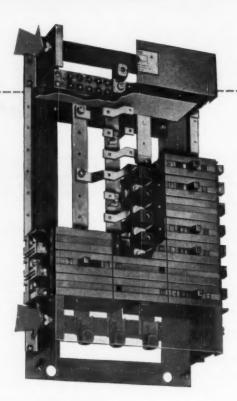
### Transformer Mounts

With the growing loads on wiring systems and consequent wiring modernization requirements, the problem of transformer placement in congested areas is often a difficult one. An economic and serviceable idea from Detroit offers an adaptable method where space is at a premium as in areaways or driveways between industrial buildings. The story, "Overhead Transformer Support", page 84, tells how platforms on steel columns have solved the problem in Detroit alleys.

### You can be SURE.. IF IT'S Westinghouse







### cut panelboard assembly time ... with "QUICK ACCESS PLATES!"

Twist just two wing bolts, and access cover can be secured or removed!

This little feature is typical of many that enables you to install Westinghouse Lighting Panelboards fast! There's nothing to remove ... No need to worry about replacing odd-sized machine screws that may be lost. And minutes saved here, plus time gained as a result of other Westinghouse features, add up to substantial savings. For example, consider the effect of these design "extras" on panelboard installation costs.

Indicating trim clamps... to speed installation of the "cabinet front".

**Sequence phasing**...to cut"ring-out" time for 3-phase, 4-wire lighting panelboards.

It's little things like these that effect big cuts

in final panelboard costs...that enable you to buy quality-constructed panelboards for less. So, next time, specify the best! Specify Westinghouse Panelboards. It's the *sure* way to slash job costs.

Descriptive Bulletin 30-930 contains complete information. For your copy, write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-40386



### Is Reuse Practical?

**ON ALTERATION WORK,** quantities of apparently sound electrical materials and equipment are torn out. Except for insulated wire, much of such material, with conscientious effort, can be restored to usefulness. Reuse looks thrifty. But is it?

TO THE USER, the cost of an electrical job is the end total of a great many items. They include materials, labor, job expense, supervision, management, tooling and all the other costs direct and indirect that the job must carry. On alteration and modernization work, the labor content is relatively high. The work must be expedited with careful and ingenious planning and selection of materials with special reference to adaptability for the particular conditions encountered.

**SORTING, HANDLING,** reconditioning and reuse of materials and equipment removed in the course of alterations is a fussy, time consuming operation that adds heavy costs at the very points where they can obstruct efficient job management most sorely. Any possible economies in the materials column are quickly consumed in other, less easily identifiable, but equally costly columns.

WHETHER MATERIALS are still "good" has very little to do with the economies of reuse. That calls for an expert understanding of modern materials, management methods, labor unit costs, procurement and all the other factors which influence installed costs. And job management responsibility includes the obligation to give the user the full benefit of much specialized knowledge. Sometimes, however, it isn't easy.

**PENNY-WISE** reclamation often leads to ludicrous extremes such as antique panelboards rebuilt and reinstalled at twice the cost of new and modern equipment, or a complete vault to enclose a museum piece of a transformer where a new air-cooled job could have been installed at a third of the cost. Unfortunately, however, most of the excessive costs of reuse are buried in labor and expense totals that cannot be hooked up.

materials reuse is almost invariably a false economy at prevailing labor costs. The safe and economical course is prompt disposal of all materials removed in the course of alteration or modernization. Some exceptions might be made for specific items of equipment which can be reconditioned economically with a minimum of handling at predictable cost and as a planned part of the job schedule. Analysis will show that items which can stand such a cost test are very few.

William Y. Stuart

### RIGHT LIGHT

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That's true whether you're installing light in plants, offices, stores, or out-of-doors. For Graybar has the biggest selection of lamps and lighting units available anywhere. Graybar Lighting Specialists have studied, planned, and supplied lighting systems of every conceivable type. That's why they can impartially recommend the best equipment for any illumination need. For an up-to-date guide in planning your lighting jobs, mail the coupon below.

### Local Stocks of Lamps

Graybar distributes all types and sizes of G-E lamps — fluorescent, filament, mercury — clear, frosted, colored — glow lamps, heat lamps, germicidal lamps, flashlight lamps. Stocks are maintained at Graybar's more than 100 warehouses throughout the nation for prompt delivery anywhere.

### EVERYTHING ELECTRICAL

In addition to the materials needed for any lighting job, Graybar can provide all the tools and supplies for wiring, communication, ventilation, and other electrical installations. All are first-quality products of leading manufacturers.

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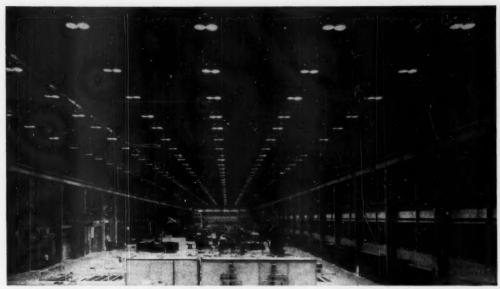
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Please send me free a copy of your 84-page book, "Planned Commercial Lighting."

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ILLUMINATION in huge Press Building is provided by twin mercury-incandescent fixtures delivering 42-footcandles of

lighting intensity to the working plane. Units are serviced from atop 20-ton traveling crane.

### WIRED FOR PRODUCTION

Underground electrical distribution, automatic switchgear, planned lighting and modern construction methods used by The Parker Electric Company contribute to the industrial efficiency of Perfection Stove Company's new Cleveland plant.

HREE essential construction requisites are apparent in the recently-completed plant of the Perfection Stove Company in Cleveland, Ohio. They are sound engineering, the application of modern electrical equipment and materials, and practical installation methods. The first of these factors is apparent in plant layout, distribution methods, basic electrical planning and high design standards-maintained as well as specified. The second is apparent in the use of substation units, cubical switchgear, automatic controls, currentcarrying mediums and high-efficiency lighting equipment. The third is apparent in construction techniques and structural details.

These factors contribute to an impressive plant, for Perfection's new Ivanhoe Road development, including Press, Finishing and Assembly buildings, contains over 18 acres of produc-

By A. D. Buschmann

Plant Engineer Perfection Stove Company

tive floor area for the manufacture of ranges, variously designed for operation by electricity, gas or kerosene. Over \$100,000 worth of automatic switchgear, the inclusion of eight 1000-kva. transformers, walk-through underground utility tunnels, a 20-ton traveling crane, more than 4000 lighting fixtures, numerous feed duct, busduct and wireway secondary distribution systems, scientific color painting and novel material-handling methods are among the many highlights.

#### Distribution

Distribution throughout the plant is primarily at 440 volts, with incoming power stepped to this level through eight 1000-kva. 11000/440-volt transformers. These units are connected to utility lines by two operative and one spare 11-kv. lead-sheathed cables, insuring continuity of service against primary current interruption. Transformers are arranged in three load-center banks; three units vault-based in the Press Building, three mat-based at the Power House, and two centrally positioned to supply the plant's extensive welding requirements.

Distribution between these three load centers and 25 secondary air-cooled 440-220/110-volt transformers is by means of straight radial systems, controlled and protected by three main metal-enclosed dead-front sectional switchgear banks equipped with drawout air circuit breakers and metering facilities as required.

Routing of power is by overhead conduit or duct positioned beyond the reach of personnel, by concrete walkthrough tunnels beneath the wood-block



TRANSFORMER banks, consisting of 1000-kva. 11000/440-volt units, are located at load centers. Supplied through lead-sheathed utility cables, they feed the plant's 3-phase 3-wire distribution bus system.

flooring of the manufacturing areas, and by metal-covered floor troughs branching to equipment positioned in open areas not adjacent to underfloor tunnels. Along the wall of the walk-through tunnel serving the Press Building, 375 feet of 440-volt plug-in busduct is located, and extensions from this busduct system run at right angles into sub-floor alcoves that extend from wall to wall of the plant beneath the heavy range-cabinet presses.

Sep rate branch circuits connect each large machine with the extended busduct system, while smaller machines are grouped together so that branch lines can utilize common wiring troughs. With the resultant flexibility derived from this busduct network and readily-reached system of branch lines, future relocation of manufacturing equipment can be effected with minimum inconvenience, merely by shifting the locations of plug-in boxes and re-routing branch lines through floor troughs as required.

Although the underfloor tunnels are justified for exclusive electrical application, they also provide an accessible passage space for water, gas and air lines. Still another advantage is that of safety, as utility supply lines, while readily available for maintenance, are not accessible to factory personnel.

#### Illumination

Forty to 42 footcandles is the average lighting intensity measured throughout the Ivanhoe plant, provided by more than 4000 mercury, fluorescent and incandescent fixtures.



SWITCHGEAR of dead-front steel-cubicle design includes circuit breakers of 200-, 400- and 600-amp capacities. These low-tension switching centers are located in the manufacturing areas they control. To control the extensive use of current in the plant, over \$100,000 worth of automatic switchgear is installed. The use of this switchgear, as well as high-efficiency lighting equipment and the variety of current-carrying mediums all contribute to production.

In the 94,000 sq. ft. Press Building, 306 pairs of Miller aluminum mercury-incandescent twin high-bay fixtures provide 42 footcandles of illumination to the working plane. Mounted 40 feet above the floor in six rows of 51 units each, the twin units have a spacing pattern approximately 17 feet in either direction. Each unit combines a 400-watt mercury lamp with a 1500-watt incandescent, emitting a cool white light as a result of blending the greenish-blue mercury light with the warm yellow-orange from the filament source.

With high lumen output being delivered from each twin assembly, the number of required fixtures for the desired illumination intensity is greatly reduced. And, with units mounted just above the crane limit, they can be serviced from a special crane platform constructed for this purpose. Both of these factors (reduced number of units and convenient mounting height) are definite economic factors in the maintenance picture. Also, with fewer fixtures, the necessary wiring is correspondingly lessened: an economic factor of installation.

Reflectors are mounted on inverted T-shaped conduit hangers which, in turn, are suspended from ballast boxes, feeder conduits and supporting messenger cables. With a supporting clamp between reflectors, the twin assemblies are rigid. With ventilated socket covers, they provide for heat dissipation and retard dust accumulation. With reflectors of Alzak aluminum, they are resistant to corrosion

and discoloration. And, operating from a single outlet, assemblies are easy to wire.

In the assembly building, maintenance building, offices, tool room area and other parts of the plant, continuous rows of 2-lamp 100-watt industrial fluorescent fixtures are mounted on 15-foot centers 16.5 feet above the floor, providing approximately 40 foot-candles at bench, machine and desk.

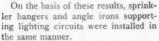
A third distinct type of lighting is to be found illuminating the parking area, roadways, walks and building exteriors, for street lights at 25-foot heights and floodlights at 35-foot elevations are supported from the same tapered steel poles. All lighting units can be raised or lowered by means of disconnecting chain-operated hangers, so that maintenance and relamping can be completed on the ground with maximum safety and minimum effort.

#### Stud Welding

Stud welding played an important part in the installation of the 3300 fluorescent fixtures located in the 9acre assembly building, for preliminary time studies revealed that the number of hangers installed per hour could be increased from 6 to 20 by using automatic stud welders rather than welding the supporting studs into steel ceiling joists by formerlyused manual methods. After studs were secured, it was a simple operation to attach fixture mounting brackets to the threaded ends of the studs and raise the double-section 2lamp lighting fixtures into position.



TUNNEL running beneath Press Building carries plug-in bus-duct as well as water, gas and air lines. Plug-in boxes control and feed branch circuits extending into floor trenches on main floor of this building.



Another construction aid was a powder-activated stud gun, used for attaching electrical equipment to masonry as well as structural steel. By eliminating the necessity for drilling and tapping holes, mounting studs could be secured in a fraction of the time formerly required.

#### Color Coding

Reduction of eye strain and fatigue, as well as the promotion of safety, housekeeping and efficiency are the achieved results of the color code recommended by consultants Faber-Birren and du Pont.

In accordance with this code, equipment and areas with distinctive purposes or hazards have distinctive colors. For example, blue is precautionary, used to designate electrical equipment such as switch boxes and controls; red is reserved for fire lines, alarms, extinguishers and protective devices; orange alerts employees to hazardous equipment capable of cutting or crushing, with guard rails around machinery and cages around electrical equipment painted this color. Yellow, because of its high visibility, is used on the plant's many industrial trucks and to indicate high hazard.

Color combinations for walls and ceilings were also selected for utilitarian and psychological as well as for esthetic reasons. For example; light blue-green was selected for the walls,



TWIN REFLECTORS are mounted on inverted T-shaped conduit hangers suspended from ballast boxes, feeder conduits and messenger cables. Combining blue-green mercury with yell low-orange incandescent gives white.

pillars and partitions in the Assembly Building. Two-tone grey is used in the Press Building because, due to the large window areas and the use of mercury vapor lighting, blue green is already present in large quantities in this space and a neutral reflecting surface was therefore indicated.

That production rests on an electrical framework is illustrated by the wide use of motorized equipment throughout the plant. Cranes, industrial trucks and motorized conveyors are used extensively; fire-pumps, re-



TAPERED STEEL STANDARDS support streetlights at 25-foot height and floodlights at 35-foot elevation. Disconnecting hangers, chain operated, permit safe servicing and relamping from ground.

volving unit heaters, roll-up shipping dock doors and adjustable loading platforms are pushbutton activated. Ten-ton freight elevators and 33person passenger cars are in use.

These many factors of good design, installation, operation and maintenance are in keeping with the name of Perfection. They also constitute visible tributes to the electrical contractor, The Parker Electric Company; to the builder, George A. Rutherford, and to the architects and engineers of the George S. Rider Company.



HANGERS for fluorescent fixtures were attached to beams by means of automatic stud welding equipment. Studies revealed that installation time with automatic equipment was reduced by two-thirds.



POWER-ACTIVATED stud guns facilitated installation of electrical equipment on masonry walls and structural steel. Drilling and tapping of holes was eliminated, while permanence and accuracy were retained.

### MOTOR SHOP IDEAS IN BOSTON

Boston—NISA's 1950 Convention City—is the hub of a concentrated million-dollar motor repair market served by a group of progressive service organizations. This round-up reveals a wealth of practical shop ideas in use, including:

- special truck bodies
- dynamic balancing
- combination bake ovens
- plastic coil protection
- storage racks
- multi-speed drill press
- inclined elevators
- rotating de-reelers
- glass insulation
- motorized dip tanks

These ideas, a few of the many being successfully applied, come from the shops of:

- Andren-Myerson Corporation
- Empire Electrical Company
- Electric Maintenance Company, Inc.
- Electrical Installation Company
- Northeastern Electric Company
- Central Electric Company
- J. J. Reddington Electric Service Co.
- Stearns, Perry & Smith Company

#### By Hugh P. Scott

MOTOR repairing is big business. Nationally, the annual bill exceeds \$100-million. That figure does not include the sale or installation of new motors. Neither does it include maintenance. It represents only one thing: motor repairs.

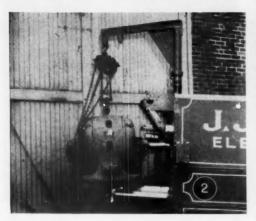
Massachusetts—host State for NISA's 1950 national convention—has a \$24-million slice of this pie, with half of this dollar-volume being handled by motor repair shops within a 35-mile radius of Boston. These shops are progressive, expertly staffed and well equipped.

A quick swing around the shops in this area offers a liberal education in motor shop practices and techniques. Practical ideas by the dozens can be observed; ideas covering not only the mechanics of stripping and winding, dipping and baking, building up worn shafts and balancing rotating elements, but covering as well the associated factors of records and inventories, shipping and materials handling, advertising and industrial safety.

1. For example—a pick-up and trouble-shooting truck, specially designed for the Northeastern Electric Company will definitely catch your eye. It will catch it for two reasons: first, because it is fire-red in color so you can't miss it but, more importantly, because it is as all-inclusive in equipment as an encyclopedia is in facts. The color makes it a 4-wheel 1-ton constantly-moving effective advertisement. The equipment, including a variety of rigging, adjustable trolleys to fit any size of I-beam, a Presto tank, extension ladder, insulation varnishes, rotating spot light, spare parts and tools, eliminates many miles of shop-to-job-site shuttling for forgotten tools or extra parts. Bins for this equipment are part of the chassis.



A hydraulic, extensible hoist, mounted to the rear of the truck, can be swung and extended to pick up loads from sidewalks or loading platforms. And, should the load prove too great for the capacity of the truck springs, jacks can be lowered automatically from the underside of the tailboard, thus transferring the load directly to the ground. Another practical idea is found in the truck's transmission case for, although the truck is rated at 1-ton capacity, the transmission is that of a lighter vehicle, allowing faster shifting, speedier get-a-way and easier handling in city traffic although the carrying capacity is not decreased. Facilities are also installed for 2-way radiotelephone contact between truck and shop office.



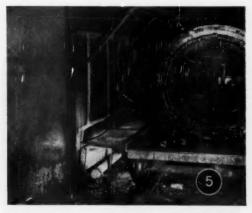
Another Boston motor shop truck carries the name of J. J. Reddington Electric Service and is equipped with a swinging boom which, mounted at the rear of a 2-ton Ford telephone truck body, swings in a complete circle, permitting loads to be shifted from the floor of the body or the ground areas behind or adjacent to the side of the truck. Transferring the load from truck to any point within the Reddington shop is also a simple, one-man job for the intra-shop overhead monorail extends through bi-parting loading doors, overhanging the truck ramp and permitting truck loads to be handled directly by this shop monorail hoist.



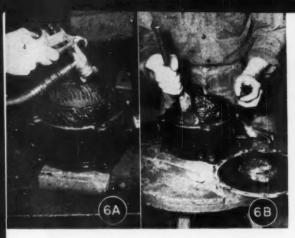
The advantages of balancing rotating parts both statically and dynamically can be clearly understood by a visit to the Electric Maintenance Company where armatures, fans and other rotating elements are machine-tested before their return to customers' premises. Knowing where compensating weights must be positioned along the axis as well as around the periphery of the rotating element makes it possible to eliminate all torque-producing force-couples, thus eliminating with certainty all vibration and minimizing the resultant wear. All guesswork is thereby eliminated from completed work and balanced performance can be predicted with assurance.

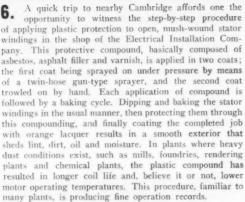


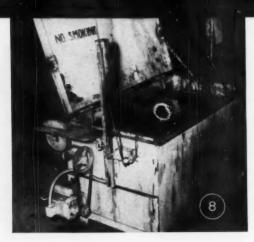
3. For anyone with a problem of dirt and debris accumulating in storage bins, the racks in the shop of the Andren-Myerson Corporation should be of interest. Constructed of wire mesh with edges metal-bound for protection, gutter-shaped troughs hold wedges, sleeving and slot insulating strips. With these troughs mounted on the inclined members of wooden A-frames, all gutterheld materials are constantly in view within easy reach and, with troughs constructed of mesh, dirt falls through to the shop floor where it can be swept up readily. Other frequently-used materials such as tapes and bindings are stored on the narrow shelves constructed on the inside of the A-frames.



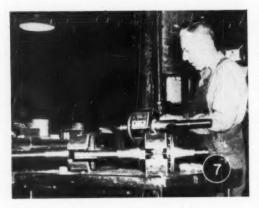
5. The combined use of gas and electric strip heaters in the same baking oven is one of several ideas to be picked up in the shop of Stearns, Perry & Smith. With the capacities as they are now installed, the gas units located at the bottom of the oven produce higher temperatures, while the electric strip heaters, mounted on the oven walls, permit more exact control. As used in general practice, gas is used throughout the day when shop personnel is available for checking and supervision. Night baking, when supervision is not always on duty in the shop, is carried out by electric means. Small motor frames are placed on shelves located in the upper sections while large, heavy assemblies are wheeled on dollies.





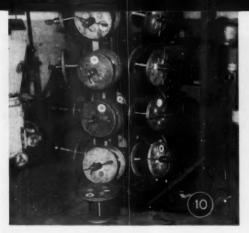


8. For shop method prospectors, the Company is a gold mine. Besides being a bright For shop method prospectors, the Central Electric and roomy showplace, Chris Dulsen's shop offers a number of modern ideas. One is a motor-operated dipping tank. Wound units are placed on a subway-grating platform which can be lowered into the insulating varnish tank or raised above the liquid level by means of a beltdriven worn-and-gear arrangement. The grating can also be stopped at any elevation, permitting wound units of many sizes to be submerged to any desired depth. When dipping cycles are completed, the grating can be raised above the varnish level and the units can remain in place until all excess varnish has dripped back into the tank, thus confining the varnish to a single location and preserving the appearance of the floor and baking oven area. Except when the grating is raised from the varnish, the tank is closed by means of a snug-fitting metal cover and, since the tank is caster-mounted, it can be moved easily to any desired location in the shops.

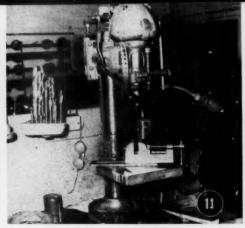


7. The value of glass insulation for high-temperature applications is another fact emphasized by operations in the shops of Stearns, Perry and Smith. For, from experience gained during the winding of field coils for more than 40 small synchronous motors used in a textile plant, they have compiled definite life-records of units insulated with organic and non-organic materials, proving that all-glass insulation can mean the difference between frequent failures and continuity of service.

Another shop where practical methods can be observed in practice is the Empire Electrical Company. One of their problems was that of materials handling between loading platform and receiving desk. For, situated on the second-floor level of a building without elevator facilities, it was necessary to find a method for raising and lowering motors, tools and materials being received or despatched. Their solution was to install tubular tracks at a 45-degree angle, paralleling the open stairway and extending from sidewalk level to the second-floor elevation. A steel-deck platform was then secured on a special rolling carriage, so constructed that the deck remains level while the wheels of the carriage rest upon the inclined tracks. The height of the deck above the tracks is such that, when the carriage is at the upper limit of travel, the deck is flush with the checking desk. It is therefore just a matter of sliding the load from the deck directly on to the desk where incoming motors are logged in or where deliveries of material are checked. The carriage is pulled up the track by means of a steel cable attached to a 2-hp. gear-head motor. As an added safety measure, steel crossmembers are located between the tracks every two feet and an engaging dog is located beneath the carriage. As long as tension remains on the hauling cable, the dog remains above the plane of these cross members but, should cable tension be released, the dog would fall, engage the cross members and prevent the carriage from slipping.



10. A second practical Central idea is their Dulsen-designed de-reeler. Constructed entirely from angle irons, the unit is five-sided, stands 5-feet in height and revolves on ball-bearing rollers moving around a circular track. Each side of the assembly holds four 12-inch wire reels, resulting in an overall capacity of 20 spools, while a foot brake makes it possible to release the unit or lock it in any desired position. Since there are two adjacent reels carrying each size of wire (with gauge numbers clearly painted on the de-reeler frame for rapid identification), wire can be used in pairs when desired. Spools do not revolve on their shafts but remain in a fixed position while the de-reeling spindles, fitted with fiber collars to protect the wire from injury, revolve about the spools to unwind the wire. Since 12-inch wire reels hold many times more wire than the 6-inch spools formerly used, considerable time is saved in changing spools and wasted wire, formerly resulting from short lengths remaining on spools after each operation, has been greatly decreased.



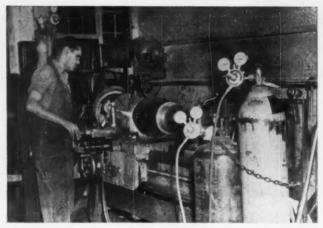
11. One more idea from Central's bag of practical tricks merit comment. It is a variable-speed drill-press using drills of various diameters. Since the diameter of each bit determines the practical speed of rotation, and since the speed of the motor is regulated by a control lever, the factor of guesswork was eliminated through the construction of a curved and slotted lever guide. Holes corresponding to the various drill sizes are drilled opposite each slot or notch, so the operator need only note the size of drill being used, match it with the hole opposite the several slots, then lower the control lever until it comes to rest in the slot opposite the proper drill hole. With the lever held in that position the speed of the motor is automatically adjusted for the size of the drill.

Before walking away from the drill-press, one more idea should be observed. For the frequently-required metal drill gauge is held ever ready by a short length of chain. This eliminates still another cause of delay, for the gauge is always available when required.





ELECTRICAL CONSTRUCTION AND MAINTENANCE . . . MAY, 1950



METAL SPRAYING for building up worn shafts prolongs the useful life of rotating equipment repaired in the machine shop of New England Machine and Electric Company, Pawtucket, Rhode Island.



material Handling is facilitated by heavy-duty monorail hoist equipment controlled remotely.

VARNISH VISCOSITY is checked regularly with sampling cup and stop watch. Assortment of J-hooks at side of dipping tank provides suspension means for all sizes of motor frames.



SPRAY GUN speeds motor finishing. High-capacity exhaust fan and vaporproof lighting equipment promote safety.

# **QUALITY Rewinds Pay**

By Hector Munro

Superintendent, Motor Repairs and Service, New England Machine and Electric Company

ENGTHENING the intervals between motor failures brings in extra repair business. New England Machine and Electric Company of Pawtucket, Rhode Island, knows from experience. In fact, extra business results in three ways. First: a motor shop having a reputation for making long-lasting repairs receives plus business in the form of wider varieties of orders from customers already served. Second: unsolicited new work comes in from plants never before served—the result of engineers in neighboring plants getting together and "passing the word". And third: fewer motor repairs paint a rosy picture for motorizing an industrial plant, and instances can be cited where extra motors have been installed due to this favorable economic study.

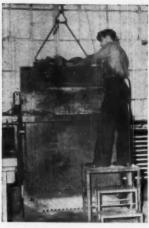
Then, there is that little matter of profits. Better jobs merit higher prices—prices paid with little complaint when customers know that the slight dollar increase will result in fewer shutdowns, continuous service, reduced maintenance and the end of nursing weak motors from failure to failure.

These are not idle statements. They

are backed by actual case studies and cold fac.s. One outstanding example is based on the success of our special varnish treatment of open frame potors.

Open frame motors have been New England industrial problem children for years. For operating conditions in the local textile finishing plants, laundries, felt and dye houses is admittedly tough on motors. Not only is heat a consideration (over steam vats and in crane service) but moisture (from milk products, water or steam), salt, caustic fumes and airborne lint are contributory factors in destroying motor insulation, causing shorts and burn-outs.

Recognizing this local problem, New England Machine and Electric Company started experimenting a decade ago with various types of varnishes and baking cycles. Stators were dipped 3, 4 or five times in these tests. Baking periods were varied between 4 and 6 hours. And oven temperatures ranged between 225- and 275-degrees F. Motors subjected strictly to excessive heat could be protected by a Class H winding and insulation job. Yet the majority of the



**DEGREASING TANK** uses permachlor at 180 degrees, removing varnish, grease and gum from equipment.



ARBOR PRESS with 60 tons capacity exerts tremendous pressure with slow, steady, readily controlled force.

# Modern equipment, practical shop and field repair methods, a trained organization and an *unconditional* guarantee are four vital factors for promoting *plus* business.

motors broke down from other causes, and the problem resolved itself into finding a solution for this special

Two routines resulted. The first, used on Formvar random-wound units, gives the stator 2 dips of synthetic varnish baked at 275 degrees for 4 hours, then 2 dips of Chinalak baked at 225 degrees for from 4 to 6 hours, and a final dip of Number 8 Dolph air-drying lacquer. Results in the majority of cases proved excellent and many mills are still using motors treated in this manner a decade ago. In fact, a majority of New England shops still use it for dye-house conditions.

For motors working under severe moisture or corrosive conditions, however, even this treatment was not 100 percent perfect and the second routine. instigated since the war, was developed. This second procedure utilizes a Class A winding with one dip of synthetic varnish to harden the windings against vibration. This is baked at 275-degrees for 4 hours. After cooling to 160 degrees (about 30 minutes), it is dipped in 996 silicone varnish, allowed to drain for 3 hours and then baked at 175-degrees for 6 hours. It is then re-dipped, allowed to drain for 3 hours, baked at 175 degrees for 4 hours, then baked an additional 4 hours at 300 degrees. A final spray of red insulating varnish is added for oil proofing.

Adherence to exact temperatures and baking periods is important for 2 reasons. First: because the varnish will undergo skin cure if the 300-degree level is approached too quickly resulting in the formation of bubbles at the vital points where coils emerge from slots. And second: because the Class A winding with synthetic covered wire is only rated at 292 degrees F spot temperature. These temperatures and cycles remain the same for motors up to 5-hp at 1800 rpm but, when motors exceed this rating, the baking periods are increased beyond the times just mentioned. For such a silicone impregnation, prices vary from 20 to 30 percent over standard rates, but this increase is amply justified by performance records.

For example: two open frame 1½-hp. gearmotors, operating side by side in a textile finishing plant under the same conditions, same schedules and same loads, were given Class A windings in 1946. There was one exception; one was taped, the other was silicone impregnated. The taped job has been rewound three times in four years. The silicone job is still in operation. In another location, a water purification pump motor on continuation.

ous 24-hour duty was silicone treated in 1947. Prior to that time the motor was rewound every four months. The silicone job is still giving service.

That word-of-mouth endorsements pay off can also be verified. To illustrate; although a company sales engineer called on a certain finishing plant for a number of years, no orders resulted until the plant superintendent attended a local engineer's meeting six months ago and heard from a friend that New England's silicone treatment was really good. A trial order resulted. That was six months ago. Six more jobs followed; then orders for some new motors and other equipment. Just recently a nice order was received in connection with compensators and bearings. Here is a case where Reputation accomplished what Salesmanship had failed to do.

Over 1000 silicone jobs have been completed since 1946. About 20 have come back since then, and these were found to be due principally to oil saturation (prior to our adoption of a finish application of oil-proof varnish) and bearing failure, rather than to windings burning out. In the few instances where contributory causes were absent, the rewind job was completed "on the house". That's proof of a sincere guarantee on a repair

About 75, percent of the motors brought into the shop are disconnected at the customer's premises by New England service men and transported in one of the company's three trucks. They are also returned in company trucks, installed and tested on the job by company field crews. And, in the event that continuity of service must be maintained, a spare motor is installed from the company's large supply while the customer's motor is under repair.

When customers do deliver their own motors to the New England shop, a frequent question is, "How new is this building?" This is due to a maintenance schedule including daily sweeping, yearly painting (inside and out), the constant repair or replacement of damaged, worn or antiquated equipment, and the frequent installation of new facilities such as modern degreasing equipment, dip-tanks with fire-control protection, a 60-ton arbor press, metal spraying equipment for building up worn shafts, and balancing machinery.

Revamping and expansion is still in progress, with an additional building now nearing completion to house the activities of New England's related

(Continued on page 186)



# FARM

## By August Eckel

HE vast project of bringing electric service to the nation's farms is approaching an end. From here on in, the biggest job will be to see that the five million farms connected to central-station hi-lines are electrified to the point where the farmers will actually reap the economic benefits of electric service. In most cases this will mean substantial reinforcement and modernization of farmstead wiring systems. This is the challenge and responsibility of electrical contractors serving rural America.

As of June 30, 1949, REA estimated that 4,582,016 of the nation's 5,859,169 farms (1945 Census) were connected, with 47.5 percent of them on REA lines. Since REA's inception in 1935, Co-ops built 939,473 miles of hi-line serving 3,031,098 customers (as of Dec. 31, 1949). Last year, 515,734 new customers were reached by 186,-042 miles of REA lines. By the end of 1950, REA and private power lines

Building	Load*	7 kw.			
Farm Residence	7-12 kw.				
Dairy Barn	8-16 kw.	0.5 watt per sq. ft. barn area plus 5 kw. for small and medium barns and plus 7.5 kw. for large barns.			
Milkhouse	2-6 kw.	10 watts per sq. ft. floor area.			
Poultry House Single Each Additional Laying Pen Each Additional Brooder Pen Poultry Cleaning, Dressing, Waxer	3-16 kw. 5 kw.	1.5 kw. 0.4 kw. 1.25 kw.			
Farm Work Shop and Machine Shed Including Welder	6.5 kw.	5 watts per sq. ft. area of shop.			
Granary, Hog House, Cornerio Sheep Shed	5-11 kw.	-			
Stock Shelters, Miscellaneous B'I'd'gs.		1 watt per sq. ft. floor area.			
Sweet Potato Curing and Storage House		4.5 watts per bushel storage capacity (2.5 bu. per sq. ft. of house area).			

TABLE I-Typical Farm Building Loads and Probable Demands



**UNDERGROUND FEEDERS** are frequently used between buildings. Here, Jeep

Depends on depth of well.

Probable Demands\*\*

Pump House General Electric Company

<sup>\*\*</sup> Handbook of Farmstead Wiring Design

# WIRING... A Field for Modernization

Farmstead wiring must be brought up to modern standards if the farmer is to reap the economic advantages of electric service. That is the big job ahead for rural electrical contractors.

will reach about 96 percent of all occupied farms in the United States.

The 15 to 18 percent of the nation's population living on farms presents a tremendous market for the electrical industry. For farms use not only household appliances, but out-building production equipment, Frank Watts of the Farm Journal estimates the market potential, including wiring, to be \$750 million per year for the next 12 years for household equipment alone; plus another \$450 million for productive equipment each year. Evidence that such a market exists was indicated by a sample cross-section farm survey made by the Bureau of Agricultural Economics, USDA, in 1948. Only 27 percent of the farms answering (with central-station service) had electric water systems; 12 percent, electric ranges; 10 percent, electric water heaters; 47 percent, electric washing machines: 38 percent, electric refrigerators; 25 percent, vacuum cleaners; and 7 percent, electric sewing machines. REA estimates that for every dollar invested in rural electric facilities, consumers will spend \$4.50 for wiring, plumbing facilities, electric equipment and appliances.

Another pertinent factor favors full farm electrification. Farm income has slipped from the 1948 peak of \$30.8 billion, but reduction of farm production costs has lagged far behind. To keep net farm income up, pressure must be put on cutting operating costs. Use of electric power is one of the quickest means of affecting such reduction. Many farmers have already proved this contention.

#### **Power Consumption Rises**

Farmers have surprised even the most optimistic of power suppliers. Their power consumption has reached unexpected levels and is still going up. REA discovered this in a survey of Co-op farm consumers using elec-

tricity for ten years. Average consumption ranged from 250 to 1,000 kwhrs. per month (the latter in irrigation areas)—a far cry from the original 50 to 100 kwhrs. for which lines were designed. Now comes the job of increasing distribution system capacity.

Rural consumption records of one private power supplier in the north central section of the U. S. clearly indicates this trend. Average annual kwhr. consumption per farm jumped from 264 in 1925 to 873 in 1935 and 1,936 in 1945. In 1948 it was 2,921 and last year 3,298 kwhrs.

As electricity finds more and more applications on the farm (there are about 400 uses now) the power consumption curve will swing upward. Rate of rise will depend upon the ability of rural electrical equipment salesmen to analyze and understand the farmer's problem; to sell him equipment that meets his needs; to



trencher opens ditch for feeder cable extending to barn.



YARD POLE SERVICE installation with meters, disconnect switches and low-voltage remote control transformer for yard lighting.

# TABLE II—Electrical Farm Equipment and Approximate Power Consumption

-	wer Consumption	
Equipment	Rating	KWH Consumption
Barn Ventilator	1/4 hp.	2 1/2 per cow per month (variable)
Bottle Washer	1/4 hp.	1/2 per 1,000 bottles
Brooder	1 kw.	1/2 to 3 per chick raised
Chum	1/6 hp.	1 1/2 per 100 lbs. of butter
Clipper (for horse or cow)	1/10 hp. or less	1/10 per hour
Concrete Mixer	1/2 or 1/3 hp.	1/2 per cu. yd. of concrete
Corn Husker-Shredder	3 to 5 hp.	30 per 100 bu. of corn husked
Corn Sheller	1/3 to 2	1 per 30 bu, shelled corn (variable)
Cream Separator	1/4 hp.	1/2 per 1,000 lbs. of milk
Dairy Water Heater	2 to 3 kw.	1 per 5 gallons of hot water (145° F)
Ensilage Cutter	5 to 7 1/2 hp.	1 per ton
Electric Fence	10-watts	7 per month
Fly Screen or Trap	***********	5 per month
Grain Elevator		4 per 1,000 bu.
Grain Grinder	1 to 7 1/2 hp.	1/2 per 100 bu.
Grain, Seed Cleaner and Grader	1/4 to 1/3 hp.	1 per 100 bu.
Green Feed Cutter and Root Shredder	1 to 5 hp.	2 per ton
Hay Baler	5 or 7 1/2 hp.	2 1/2 per ton
Hay Hoist	2 to 5 hp.	1/3 per ton
Hay Curing	1 to 7 1/2 hp.	40 per ton of dry hay (variable)
Hotbed	440 watts per 3' x 6' bed or per 60 ft. of cable	1 per sq. yrd. per day
Incubator	1 kw. and larger	1 per 25 eggs set
Irrigation (surface)	variable	3 to raise an acre-foot of water 1 ft.
Milking Machine (portable)	Up to 1/4 hp.	1 1/2 per cow per month
Milking Machine (pipe line)	1/3 to 3 hp.	2 1/2 per cow per month
Milk Cooler	1/4 to 3/4 hp.	30 per 10 gals. milk daily, per month
Paint Sprayer	Portable 1/10 hp. Stationary—up to 1/2 hp.	1 1/2 per 1,000 sq. ft.
Poultry House Lighting	Variable	5 per 100 birds per mo.
Poultry Water Warmer	Up to 500 watts	1 per day
Sheep Shearer	1/10 to 1/4 hp.	2 to shear 100 sheep
Straw Cutter	1 to 5 hp.	2 per ton
Threshing Machine	7 1/2 hp.	1 per 8 bu. of grain
Tool Grinder	1/4 to 1/3 hp.	1/2 per hour of use
Ultraviolet Lights for Poultry	300-watts per 600 cu. ft. space	7 per 100 hens per mo.
Utility Motor	Small 1/4 hp.	1/2 per hour of use
Utility Motor	Large 3 to 5 hp.	1 per hp. per hour of use
Water Pump (deep well)		1 1/2 per 1,000 gals.
Water Pump (shallow well)	1/4 to 1/2 hp.	1 per 1,000 gals.
Wood Saw	1 to 5 hp.	2 per cord of wood

U. S. Department of Agriculture Westinghouse Electric Cosp. convince the farmer that he will get a dollar back for each dollar he invests. The need is there. The market is wide open.

More importantly, the development of this farm electrical market will be a direct function of farmstead wiring adequacy. The farm family wants and needs the electrical conveniences of urban living. They should have them. The farmer urgently needs kilowatts to do his production chores—milking, feed grinding, hay hoisting, barn cleaning, running water, and others. He should have them. But, can the farmstead wiring system—in its present condition—take care of his needs?

Let's face a few facts. Reports show that about 40 percent of farm homes were built between 1900-1920; 30 percent between 1920 and 1940; and approximately five percent since 1940. Rural electrification really gained impetus in the middle 30's with capacity for comparatively small loads, primarily household in nature. Past tendency always has been to add load to existing circuits without too much regard for capacity. This holds for urban as well as rural areas. The answer to the above question, with few exceptions, is obviously No. Unless the farmer was foresighted enough to anticipate his future needs (which is doubtful) or has modernized his electrical system. Undoubtedly many farmsteads throughout the country are being deprived of full utilization of their electrical servant by wiring systems that are straining at the seams to handle present loads.

#### Modernization the key

Modernization of existing farmstead wiring systems and careful planning of new installations are the keys to this vast rural electrical equipment market. Without adequate electrical system facilities in the form of ample circuit capacity; convenient control and efficient operation of production equipment, the electrical industry cannot hope to do even a good job in this market. You cannot, with any sense of responsibility, sell equipment that will not produce the expected results. And equipment will not operate efficiently on overloaded circuits.

This places the electrical contractor and contractor-dealer squarely in the middle—where he should be. He is the key man in the picture. He has the technical knowledge, installation know-how, facilities for service, and appreciation of farm application problems. If he didn't possess these qualities, he wouldn't stay in business long.

Farm wiring modernization is

nothing more than reinforcing and supplementing the existing electrical system so the farm family can use equipment that will annually slash some 640 hours off household chores: 684 hours off milking time. An electric water system can increase milk production from 5 to 10 percent; lights and water warmers in poultry houses can boost egg production 11 to 20 percent; hay driers can increase value of the crop from \$5 to \$10 per ton. With proven production economies like these awaiting him, the farmer cannot afford to be without electrical system adequacy.

Increased capacity needs generally is the cause of farm wiring obsolescense. Whether conductors were originally installed undersized or they became so due to added load, the net result is the same; Loss of light; loss

of power; longer operating periods for heating equipment; and a definite limitation on new equipment instal-

A farm wiring project cannot be a hit and miss proposition. It must be designed to fit individual requirements the same as any industrial or commercial system. Each farm building is a wiring system in itself with branch circuits and service entrance. All are tied together by a yard distribution system that usually originates at a central yard pole.

#### Step-by-Step Design

First step in a farm wiring modernization project is a complete survey of all farm building electrical requirements including the farm home. List all present and anticipated future loads in each structure. Include adequate control facilities and proper circuit protection. Design branch circuits and service entrance accordingly. Provide driven ground facilities at each building. Use Power Load and Service Equipment Tables (I, II, III,) as a guide.

After completing the individual farm building surveys and calculating loads and service requirements, work back to the center yard pole. Design building feeders with a maximum voltage drop of two percent. Design feeder from transformer to yard pole to carry total calculated load (after applying demand factor) at a maximum of one percent voltage drop. If overhead spans are too long for the strength of the conductors, plan to use additional poles or larger wire size.

Make a free-hand sketch of the new vard distribution system. It will

#### TABLE III-SERVICE EQUIPMENT-FARM STRUCTURES

			Electrical Service					
Type of Building		Installation	-	Service Capacity (Amperes)				
		Installation	Туре	Entrance Conductors	Switch	Fuse	Circuit	
	Small (Up to 1000 sq. ft.)	Normal amount of lighting. Water pump. Utility motor (up to 5 hp).	3 wire, 115/230 V.	50	60	60	70	
Dairy Barn (Complete Barn Including Milk Room)  Medium (Up 2500 sq. ft.)		Normal amount of lighting. Milking machine, milk cooler. Water heater. Utility motor (up to 5 hp).	3 wire, 115/230 V.	65	100	80	90	
Large (Above 2500 sq. ft.)		Normal amount of lighting. Milking machine, milk cooler. Water heater, water pump. Utility motor (up to 71/2 hp).	3 wire, 115/230 V.	95	200	150	125	
Milking Barn (Incl —Cows not Hous	sed)	Normal amount of lighting. Milking machine, milk cooler, water pump, water heater and sterilizer.	3 wire, 115/230 V.	35	60	35	35	
Milk House (Who Barn)	en Separate from	Normal amount of lighting. Milk cooler, water heater and sterilizer.	3 wire, 115/230 V.	30	30	30	35	
Horse, Beef Cattle, Sheep and Hog Barns  Small (Up to 1000 sq. ft.)  Medium (Up to 2500 sq. ft.)  Large (Above 2500 sq. ft.)	Normal amount of lighting. Pig or lamb brooders. Utility motor (up to 1 hp).	3 wire, 115/230 V.	30	30	30	35		
		Normal amount of lighting. Pig or lamb brooders. Utility motor (2 to 5 hp).	3 wire, 115/230 V.	50	60	60	70	
		Normal amount of lighting. Pig or lamb brooders. Utility motor (up to 71/2 hp).	3 wire, 115/230 V.	70	100	100	100	
Poultry Laying House (Iucluding Feed Room)  Up to 4000 sq. ft. pen floor area  Above 4000 sq. ft. pen floor area	Normal amount of lighting. Water warmer. Feed grinder (up to 1 hp).	3 wire, 115/230 V	30	30	30	35		
		Normal amount of lighting. Water warmer. Feed grinder (up to 2 hp).	3 wire, 115/230 V	50	60	50	50	
Poultry Brooder (Portable)  Poultry House  Brooder (Portable)  Foolony Brooder House (Up to four)  Colony Brooder House (Above four)		Normal amount of lighting. Brooder-water warmer.	2 wire, 115 V.	20	30	15	15	
	Normal amount of lighting. Brooders-water warmers.	3 wire, 115/230 V	30	30	30	35		
	Normal amount of lighting. Brooders-water warmers.	3 wire, 115/230 V	(Estimate 1250 watts per brooder pen)					
Poultry Cleaning a	nd Dressing House	Normal amount of lighting. Poultry scalder, waxer, wax reclaimer, picker, and re- frigerator equipment.	3 wire, 115/230 V		60	50	50	
General Farm Buildings		Minimum capacity where lighting, motors, and mis- cellaneous 115 and 230 volt equipment will be used.	3 wire, 115/230 V		30	30	35	
		Minimum capacity where only lighting and small portable tools may be used.	2 wire, 115 V.	30	30	30	35	

#### TABLE IV-Factors to Consider

Among factors to consider when planning a farm wiring system, whether for an original installation or a modernization project, are:

SERVICE CAPACITY—should be adequate to serve present and future needs of each building. Include provisions for new buildings to be erected in the future. Provide for spare circuits.

VOLTAGE DROP—should be kept to a minimum. Recommended values are: One percent for yard pole feeder; two percent, building feeders; three percent, branch circuits.

BRANCH CIRCUITS—should be adequate in number and capacity to handle all load requirements. Provide for ample spare capacity. Follow NEC rules, but remember these are minimum safety standards. Skimping on branch circuits is an economic fallacy that proves costly in the long run.

OUTLET LOCATION—should be as close as possible to the equipment. Provide enough outlets in the home and production buildings; also power outlets in all areas where the universal portable motor may be used. Long extension cords are an inherent hazard and increase electrical losses.

YARD LIGHTING—on distribution poles and building exteriors is a must on the farmstead. Farm chores begin before sunup and end long after sundown.

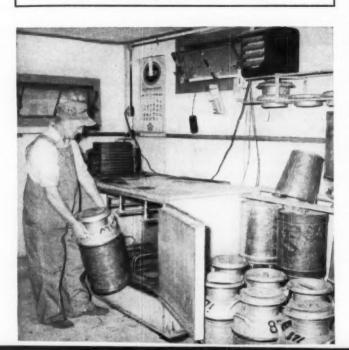
AUTOMATIC CONTROL—can be used in many locations. On home heating, water heating, poultry house lights, it can be a real asset to economical farm operation.

CONVENIENT CONTROL—can eliminate many steps and add many hours to the farm family's productive day. Low-voltage remote control of yard and building lighting; remote pushbutton control of motorized equipment can make a "pushbutton" farm a reality.

MODERN EQUIPMENT—is as much "at home" on the farm as in urban areas. Modern lighting units, modern appliances, efficient motorized equipment have a place on every farm.

PROPER MATERIALS—are an important factor in farm wiring, particularly in the dairy barn and other areas where corrosive and moist atmospheres are prevalent.

ELECTRICAL SAFETY—is of utmost importance on the farm. Adequate grounding facilities and strict adherence to established circuit protection rules can save life, property and farm animals.



probably be similar to the Wiring Wheel shown in Fig. 1. Developed by the Agricultural Extension Service of Iowa State College, this Wheel lists electrical uses common to many farms; indicates size, maximum length and number of conductors from distribution pole to buildings concerned. Should under ground feeders be used, the distribution pattern might differ in that a single feeder might serve two or more buildings. The same load and voltage drop considerations apply in both cases.

Yard pole metering and distribution is considered the most flexible and economical system. Copper from the pole need be large enough to serve only the building concerned. Outages due to fire or electrical failure in any one structure will not affect operation of the rest of the system.

Finally, a comparison between the re-wiring plan and the existing installation will show what is specifically needed to bring the wiring up to modern standards.

Typical example of a farm re-wiring project, from the standpoint of yard distribution, is shown in Fig. 2. This Iowa demonstration farm was one of a number which, though adequately wired at one time, became electrically obsolete with increased use of kilowatts. Note the shift from two-wire to three-wire service and yard pole distribution; the increase in feeder sizes; the inclusion of future building loads; and the notable improvement in voltage drop losses.

As a business man, the farmer knows the meaning of profits and losses; as a worker he knows the advantages of saving man-hours; as an individual he wants to give his family all the living conveniences he can. For sales promotion, talk electrical modernization in terms of economies and better living conditions—not in terms of "outlets".

Responsibility for modernization of America's farmstead electrical systems lies squarely on the shoulders of the electrical contractor. He, alone, can push a modernization program into high gear. The market is there waiting for him. Coupled with contractor activities, however, is the close cooperation of the manufacturers, distributors and electrical inspection authorities. Together, they can make America's farms electrically the most livable and efficient units in the world.

MILK HOUSE REFRIGERATION unit can save upwards of \$5 per month on milk cooling. Fan type heater and hot water heater are other necessary electrical units for this grea.

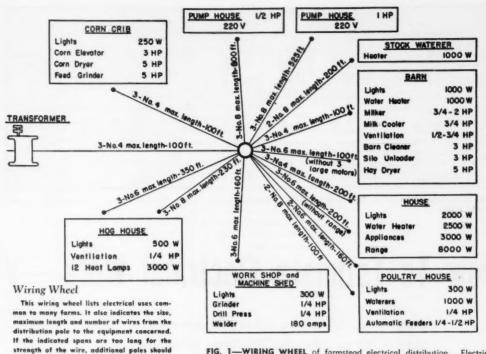
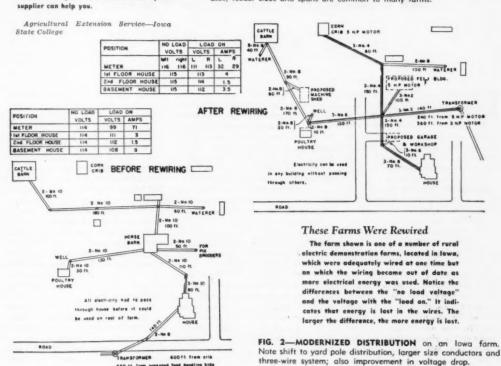
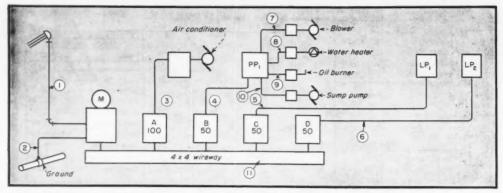


FIG. 1-WIRING WHEEL of farmstead electrical distribution. Electrical uses, feeder sizes and spans are common to many farms.



be used or larger wire substituted. Your power

450 It from pr



RISER DIAGRAM plus plan locations plus specification descriptions are the raw data from which exact equipment listings must be made.

# How To Estimate Electrical Work—V

**HOW** to take off data for listing equipment items.

**HOW** to fill out unspecified information required for listing.

**HOW** to detail data to give exact description of the work.

By W. T. Stuart

AKE-OFF and listing of items of equipment can be handled with more precision than any other part of the estimate. Yet far more costly mistakes are made in this part of the estimate than in any other. We are dealing here with materials and equipment which require descriptive detail as well as simple counting.

Consider the following take-off from the accompanying riser diagram:

- 1-Meter cabinet
- 1-Wireway
- 4—Service Switches
- 1-Power Panel
- 2-Lighting Panels
- 5-Disconnect Switches

The quantities are correct, but obviously the take-off is useless in this form. The descriptions are inadequate to define the specific items of material we need for costing labor and materials. We need overall size, electrical characteristics, circuit details and type of enclosures. We need to know the number of connections and what size.

On very large jobs carefully planned and specified, such equipment details are usually given in complete form. On ordinary work, they may be more or less precisely described or entirely unmentioned in the specifications. It is here that a major cause of error can be introduced. Whether or not the plans and specifications are exact and detailed, the listing must be. Otherwise, the item cannot be accurately priced, nor can labor units be applied.

For the purpose of this example, the riser diagram, plan locations and the following specification paragraphs are all of the details available.

"A meter cabinet  $16 \times 16 \times 4$  with meter trim will be furnished by others. Service switches A and B shall be circuit breaker types, approved for service entrance duty. Service switches C and D shall be externally operable switch and fuse approved for service entrance duty.

"Panel PP1 shall be circuit

breaker type with the following circuits, 2-20 amp., 2-pole and 4-15 amp. single pole, two of which are spares.

"Panels LP1 and LP2 shall be switch and plug fuse, 12 circuits each."

This specification data provides some further detail, but as can be noted from the example of "Equipment Listing", there are several points that must still be filled in by the esti-

For example, on the meter cabinet there is no data on whether or not the cabinet contains lugs. If not, they must be furnished. On the entrance switches, the size of wires must be derived from the feeder schedule. (E. C. & M., April 1950, page 57), the type of trim and mounting from the entrance detail.

Where connections to equipment are indicated, it is important to carefully detail the extent of the work reouised.

On this point, specifications are notoriously lax. It should be determined and preferably in writing exactly what part of the equipment installation and connection is called for in the wiring contract. Further, the estimate should show clearly just how the plans, specifications and instructions were interpreted. For example, the oil burner connections noted are to terminals provided at the equipment. It is assumed that wiring required for the oil burner installation, controls, etc. will be negotiated separately with the oil burner supplier, or provided by him. If such details are always clearly spelled out on the take-off and listing, they provide an automatic check on possibly unwarranted assumption as to the scope of the work required.

#### Catalog Number

A useful alternative to listing considerable descriptive material is the use of manufacturers' catalog numbers. Such numbers are usually descriptive in their content and give a convenient shorthand description. It is important, however, that the estimator and others who might work on his listings become thoroughly familiar with one particular catalog and numbering method.

Where panel and switch details must be worked up by the estimator, a familiarity with standard cabinet dimensions and panel arrangements is important. Job requirements often work out in odd circuit sizes and grouping. Minor changes can usually be made to bring the panel specifications within the scope of standard cabinets and groupings readily available from wholesalers' stocks.

#### Other Equipment

We have discussed above the most common items of job equipment, service entrance switches, panelboards, disconnect switches and fixed equipment connections. The same detailed listing procedure can be used on motors, controls, and other items required in the contract. For the material price, we need sufficient description for exact selection from catalogs or manufacturers data. For the labor cost, we need dimensions, weight and the specific electrical connections required. On more elaborate equipment, such as a load center substation, the kind of data required in the listing is essentially the same. The equipment must be handled to the point of installation, assembled and erected and the connections made. The visualizing necessary to make the detailed listing helps to break down the installation to simple components easy to cost.

1 METER CABINET (by others)

6-#2/0 lugs, pressure type

1—#1 lug

Mount on wood

1 ENTRANCE SWITCH—100 A circuit breaker 6—#4 lugs (with switch)

Surface trim-mounted on wood

1 ENTRANCE SWITCH-50 A circuit breaker

3-#4 lugs (with switch)

3—#6 lugs (with switch)
Surface trim—mount on wood

1 ENTRANCE SWITCH-60 A switch and fuse

Type C for entrance duty

3—#4 lugs (with switch)

3—#6 lugs (with switch)

Surface trim-mount on wood

1 ENTRANCE SWITCH-60 A switch and fuse

3-#4 lugs (with switch)

3-#6 lugs (with switch)

Surface trim-mount on wood

1 PPI-Circuit breaker type 3 wire SN main

3-#6 lugs in main (with panel)

2-20 amp., 2 pole, wire circuits

2-15 amp., 1 pole, 2 wire circuits

2—15 amp., 1 pole, spare

Surface trim-mount on wood

Single door with catch

Cabinet 14 x 10 x 4

Finish-Manufacturers standard

No index required

1 LP1-Sw. and fuse 3 wire SN main

3-#6 lugs in main (with panel)

8-15 amp., 1 pole, 2 wire branches

4-15 amp., 1 pole, spares

Flush trim-plaster on wood lath mounting

Single door with catch

Cabinet 14 x 10 x 4

Finish-manufacturers standard

No index required

1 LP2-same as PL1

1 AIR CONDITIONER CONNECTION

3-#4 lugs to terminals by others

2 20 amp. disconnect switches type c

2 pole, 240 volt, 2 wire

2 15 amp. disconnect switches type c

1 pole, SN, 2 wire

1 BLOWER (in separate contract)

2-20 amp. connections to terminals provided

1 WATER HEATER (in separate contract)

2-20 amp. connections to terminals provided

1 OIL BURNER (in separate contract)

2-15 amp. connection to terminals provided

1 SUMP PUMP (in separate contract)

2-15 amp. connection to terminals provided

OTES:

Lugs noted as "With switch" or "With panel" are included with the equipments and are listed for labor unit extension only.

No special knock-outs or hole cutting is required as manufacturers standard ko's are adaptable.

# Overhead Transformer Support

Transformer platforms on steel columns solve congestion problem in Detroit alleys; have economic and service edge over vaults. Design can be adapted to areas where space is at a premium.

> By E. L. Leinbach and G. A. Matthews

Detroit Edison Company Detroit, Michigan



**SPACE SAVER**—Overhead steel transformer structure solves space problem in Detroit alleys; costs one-third price of a vault. Columns (arrow) provide raceway for secondary and primary conductors.

HE cost of conventional network transformer vaults and the increasing difficulty in finding space for them in crowded downtown alleys indicated some years ago that an above-grade transformer support would be desirable.

The structure shown in the accompanying photograph was designed for 300 and 500-kva, transformer assemblies. Its cost in place is about one-third that of a vault. It takes little space below grade, clears truck bodies and imposes a minimum of traffic interference on the surface. The equipment is accessible at all times. Parked cars or trucks are not the obstacle under the steel structure that they are on top of a vault.

Due to being completely welded with full-strength welds, the structure is very strong, carries a dead load of about six tons with a safety factor of about four. The support has high impact resistance which is important due to heavy truck traffic in the narrow alleys where it is placed.

The vertical support members are two 8-in. by 8-in. by 31-lb. wide-flange beams, 24 feet long at 7'-8" centers. The frame for the transformer assembly is built of 8-in. channels with 3-in. channels the short way recessed so

that the transformer nests into the main frame. Since the frame is 2'-6" wide, gusset plates are welded at 45 degrees to the face of the columns to support the front of the frame. At three feet above grade, a 12-in. 32-lb. ship channel is used as a combination strength member and a wheel guard. Where possible, it is matched to the guard rail on the building.

Columns, frame and channel are full-strength welded in the shop. The completed structure is handled with a crane and delivered to the job by truck. A crane lowers it into the hole and the columns are concreted in place. The back of the columns are placed 3 inches from the building and the top of the platform is 15'-10" above grade.

The working platforms at each end are bolted on after erection.

The foundation, a 3-ft. by 3-ft. block of concrete about 9 feet deep for each column, is separated from the building wall by a felt strip. Ground rods, tested to give a maximum ground resistance of 5 ohms per transformer, are driven in the bottom of the excavation before concreting. Cable sweeps and ground leads are concreted in.

Secondary cables are brought through the sweeps and up between the flanges on each side of the left hand column as shown in the photograph (arrow). Primary and signal cables are brought up the right hand side of the right hand column. Cover plates, held in place by studs, protect the cables from damage and unauthorized interference.

The network transformer and protective switches are assembled into a complete unit in the shop. Switch housings are welded to the transformer, all connections are made and the unit is tested before being delivered. In the field a crane picks it up and sets it into the nest on the top of the structure. Primary, secondary and signal cable connections are made and the unit goes into service.

Downtown Detroit has a complete alley system which makes the use of this structure possible. Although its use would be very limited if no alleys existed, it is generally much easier to find space for this structure than for a conventional transformer yault.

Operating crews much prefer this structure since the insect and animal life and alley refuse common in a vault is absent upstairs.

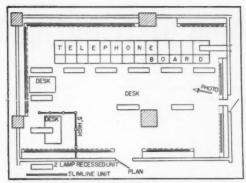
We find that this method is economical, safe and very useful for the support of network transformer assemblies where conditions permit its use.

# Switchboard Lighting

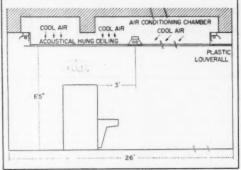
Critical lighting intensities, prescribed by telephone company engineers in accordance with wide experience, is accomplished by a direct-indirect installation.



RECESSED LOUVERED FIXTURES and cove lighting around the perifery of this 10-position switchboard meets exacting specifications of telephone engineers.



**POSITION OF RECESSED UNITS** minimizes reflected glare from the key shelf and jack panel; also permits operators to quickly recognize lighted jack lamps.



**LIGHTING FIXTURES** are recessed into the air conditioning chamber located above the suspended ceiling which hides the massive building beams.

10-POSITION telephone switch-board, installed in the central office building of the Consolidated Edison Company of New York, is the result of careful planning, experimentation and final installation. The combination of direct and indirect lighting, installed above a hung acoustical ceiling in the air-conditioning chamber, and the tasteful use of color provides a pleasing atmosphere in which to work. This is attested to by voluntary approval expressed by operators as well as Edison supervisory and engineering personnel.

Frink two-lamp recessed eggcrate louvered troffers are installed on 6-foot centers in both directions, with

the units positioned parallel to and 3-feet behind the face of the switchboard. Louvers, having a 45-degree crosswise shielding angle and a longitudinal cut-off of 30 degrees from the horizontal plane, are finished in a dark grey matte thereby reducing the brightness ratio between louvers and adjacent ceiling. In consideration of color, and to minimize strobe effect, soft white lamps were used with high power factor ballasts. Individual recessed units of the same type are positioned directly over supervisor desks, providing lighting intensities of 20 footcandles at desk levels.

Lighting intensities on the board itself are not high—by design. For the

telephone company, from wide previous experience with switchboards, specified that the lighting on the key shelf should fall between 5 and 10 footcandles, and the level of the jack panel should lie between 3 and 7 fc. This was necessary to eliminate reflected glare and to allow operators to quickly distinguish the tiny jack lights.

Side and end walls, painted pastel green, are cove-lighted by 4500-degree slimline lamps operating at 120 ma and positioned just inside the limits of the suspended ceiling. Plastic egg-crate louvers are installed beneath these lamps over the entrance door so that people passing in and out of the room are not disturbed by direct light.

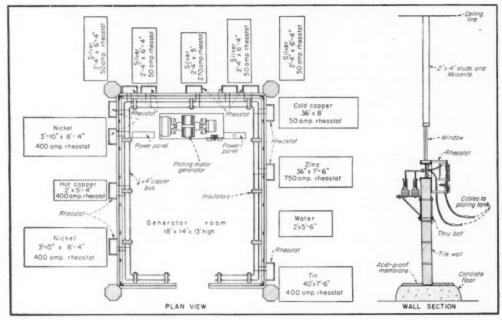


OLD PLATING ROOM had tanks along the walls; long dc distribution circuits.



NEW ROOM has tanks around three walls of centralized genera-

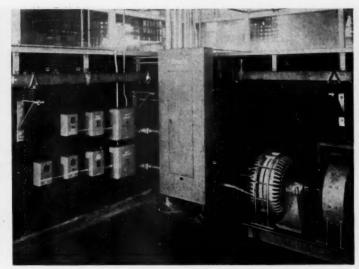
# **Compact Plating Room Distribution**



CENTRALIZED GENERATOR ROOM plan and tank layout. Note ring distribution bus. Wall section shows detail of bus connection to tank rheostats.



tor room. Plating bus is Inside enclosure. Leads are short.



GENERATOR ROOM interior showing motor-generator set, dc ring bus, power panel and remote contactors for ventilating system. Positive air pressure keeps out dust.

Centralized generator room houses plating buses, cuts power losses and maintenance cost to a minimum in new plating room at Liquid Carbonic Corporation's Chicago Plant.

#### By Robert B. Burton

Supervisor, Electrical Maintenance and Construction The Liquid Carbonic Corporation Chicago, Illinois

PART of a modernization program at the Chicago plant of The Liquid Carbonic Corporation involved the relocation of the plating room. The old layout was of the conventional type with plating tanks located at right angles to the walls of the room. Electrical service to the tanks was of the conduit and wire type subject to the corrosive atmospheres inherent in a plating operation. Exhaust facilities bordered on the inadequate side. Electrical losses were substantial and maintenance was approaching excessive proportions.

The new plating room was specifically designed to cut operating costs and increase efficiency. In contrast to the old layout, the new room was designed with an 18-ft. by 14-ft. by 13-ft. high generator room in the center of the 100-ft. by 80-ft. area. To cut electrical distribution runs to a minimum, the plating tanks were located adjacent to and at right angles to three walls of this room.

Wall construction consists of hollow tile up to approximately a five foot height. Above that is a continuous 8-inch high insulating panel of ebony asbestos for plating tank connections.

Heart of the plating operation is the equipment housed by the generator room. A 1,500-ampere, 32-volt, dc motor-generator set feeds two ½-in. by 4-in. copper buses which encircle the interior of the enclosure. Insulator brackets support the buses at insulating panel height. Bus taps project through the asbestos panel and connect to rheostat controls mounted on the exterior walls. Leads to tank electrodes are short.

Also housed in the generator room are the distribution panel and remote control contactors serving the ventilating and power requirements of the area. Adequate space still remains for installation of additional plating generator units if needed. A smaller unit is housed at the far end of area.

Contributing, to a large extent, to the reduction of operating and maintenance costs is the well engineered ventilation and exhaust system. Two fresh air intakes with associated duct and blower systems provide 23,260 cfm. of filtered (heated in winter) air for the plating area. Two exhaust fans with a total capacity of 26,205 cfm. remove fumes from duct manifolds around the tanks. A complete air change takes place every 1½ minutes.

Three features of the new design combine to reduce electrical operating and maintenance costs:

- The generator room ring bus with the adjacent short connections to rheostats and tanks substantially cuts electrical losses.
- Constant removal of fumes from the plating area reduces tank rheostat and lead cable maintenance.
- Concentration of electrical equipment and maintenance of a positive air pressure in the generator room keeps fumes, dust and dirt out of the room and away from electrical contacts.

In the old area, generators and electrical equipment required weekly check-up and cleaning (16 manhours). In the new plating room a monthly check (8 man-hours) is all that is necessary. Dressing generator commutators, bus connections and electrical contacts is now a minor chore. Annual saving in plating room electrical maintenance totals 736 manhours.





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The new "Frosty Finish" has a cool, smooth, hard feel. Doesn't get soft or tacky.



"Frosty Finish" Loomwire will not stick to your hands.



Slick!

The "Frosty Finish" won't "dust" or flake off when you pull the cable overhead.



Tests show that in temperatures as high as 125° F. the coiled wire does not stick together... pulls from the carton freely... is easy to fish.

SOLD THROUGH LEADING ELECTRICAL WHOLESALERS.

At last, a non-metallic sheathed cable that meets every "ease-of-handling" requirement . . . can be stored in warm locations or handled in hot weather without becoming tacky... maintains all the moisture-and flame-resistant qualities of the original NE Canvas Back Loomwire.

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# **Practical Methods**



**GENERAL VIEW** of United Air Lines maintenance plant at San Francisco Airport shows details of bus duct installation carrying 3-phase 4-wire 120/208-volt current throughout the 16.5 acre area. Duct system is divided into six sections, each served by separate transformers.

## Plane Maintenance Relies on Bus Duct

One of the largest maintenance bases in the world, located at San Francisco Airport and installed by United Air Lines to service and recondition their fleet of huge passenger planes, employs over 1000 electric motors for driving machine tools and other equipment



**BRANCH CIRCUITS** are made with the use of plug-in switch boxes and rigid conduit. Low voltage drop, flexibility and excess capacity are advantages of this system.

spread over a floor area of 16.5 acres. As stated by F. A. Page, manager of this operating base, "Because of the nature of our business, we must be prepared for new developments and the changing maintenance problems they will entail." For this reason, it was necessary to select a distribution system which would provide flexibility for rearrangement of machinery, be rugged enough to handle the loading problems of shifting centers of operation, and be salvageable so that, if required, the system could be altered to meet changing demands. The answer was found in extensive bus duct.

The bus system installed, manufactured by Westinghouse, is in six parts, with four 500-kva transformers located in each of four main plant sections, and two additional transformers of 200-kva. capacity located in the hangars. A separate bus duct system is served by each of these transformers. Since the systems are 4-wire 3-phase 120/208-volt ac, it is possible to use any combination of single-phase and 3-phase machines in any area.

In operation, the installation is proving the efficiency of a system having low voltage drop; the result of carrying service feeders directly into service areas and thus minimizing the length of higher branch lines.

## Wiring Parapet Floodlight Units

- WIRING

The unique method of floodlighting the 8th floor open-air terrace from the 19th floor roof parapet at the Terrace Plaza Hotel Building in Cincinnati created some interesting wiring installation problems. The floodlights are enclosed in parapet "houses" equipped with hinged "doors" on the terrace side. Mounted to the inside of these doors are mirrors which reflect the light down on the terrace 150 feet below. The entire assembly of 30 3,000watt floodlights, as well as the door opening and closing mechanism had to be conveniently controlled from the terrace level and the units had to be accessible from the roof for maintenance and repair.

Thirty circuits serve this floodlighting group—one circuit per 3,000-watt



ROLLED OUT ON roof terrace, this 9,000-watt floodlight unit (3 lamps) can be easily maintained and repaired. Front frame houses color screens.



DOOR MOTOR is installed at one end of the long parapet housing that encloses all floodlighting units. Note convenience outlet for portable tools or trouble light.



# An EXCLUSIVE Oster Feature!

Chuck and unchuck pipe or conduit INSTANTLY with the Oster "SPIN-FAST" Front Chuck! It's standard equipment on the following Oster threading machines which have STATIONARY die-heads:

Nos. 502 and 502D "Pipe Master" portable threading machines.

No. 582 "Tom Thumb" portable threading machines.

Nos. 702 and 782 "Rapiduction Jr." floor type threading machines.



The exclusive and patented "SPIN-FAST" Speed Chuck is a "sample" of the FEATURE-VALUES you get when you buy Oster power threading machines.

It all adds up to MORE FOR YOUR MONEY when you buy an Oster.

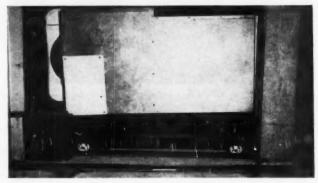
All Oster machines equipped with the "SPINFAST" Speed Chuck have the same standard range: 1/4" to 2" pipe. Bolt range 1/4" to 11/2".

THE OSTER MANUFACTURING CO.
2081 East 61st Street • Cleveland 3, Ohio, U.S.A.





**FLEXIBLE CORD** connections go from individual receptacles in metal enclosure to each 3,000-watt lamp in the 3-lamp unit. Note toggle switch on each lamp and ground connection between building steel and floodlight carriage.



**SIDE VIEW** of floodlight unit in parapet enclosure. Note receptacle box (lower left); rubber tire casters in channel track; vertical adjustment of unit on carriage frame. Hinged, mirrored doors are at right of supporting column.

lamp. Each unit consists of three 3,000-watt lamps assembled in a housing that rolls on noiseless casters. Each unit slides into a parapet enclosure or "doghouse" and is fed by three heavy-duty receptacles in a square metal enclosure. Individual cord connections go to each lamp and the metal carriage is grounded by flexible cable connection to the parapet enclosure steel. Built into each lamp unit is an individual toggle switch control that is supplementary to the remote circuit controlling the operation of the roof-based lighting units.

All mirrored "doors" open and close simultaneously through a lever arrangement on a master shaft operated by a motor and gear assembly. This operation is also remote controlled from the terrace level.

Maintenance of the floodlight units is simple. The ground connection is disconnected, plugs removed from the receptacles, channel track pins removed and the unit rolled out on the roof terrace for inspection and repair.

## **Cable Salvage Reel**

-WIRING

Electrical contractors are frequently called on to pull cables (usually lead-covered) out of underground ducts or conduits either to be reused elsewhere or replaced with different conductors. Normal procedure generally has been to pull out the cable with a winch or truck, let it lie on the ground, then wind it on a reel for transportation, storage or re-installation. Not only does this procedure require considerable time, but it may involve damage to the cable sheath.

In Lansing, Michigan, the Barker Fowler Electric Company developed a technique that pulls the cable out of the duct and winds it on a reel in a single operation. Man-hours are reduced substantially and the possibility of sheath damage is minimized. To do this, construction superintendent C. G. Fox designed a special steel reel with I-beam saddle and frame that also supports a conventional motor-driven winch.



# "I'm clinching rush panelboard jobs with my own basic supply of Pushmatic\* Electri-Centers!"



1 "I took a tip recently from my local BullDog Distributor and started an emergency Pushmatic stock with several basic Electri-Centers and fronts plus . . . 2 "a few cartons of Pushmatics (they're all the same size, regardless of ratings or types, and fit any Electri-Center, so you don't need too many).

3 "With this supply, I was ready for that rush order yesterday. All I had to do was hook the right Pushmatics on the mounting rib and connect them to bus bars with a screw driver. 4 "Now I'm always sure of having the right equipment on hand and being Johnny-on-the-spot when a rush order comes in. My customers appreciate that fast service,

This timesaving plan is paying off every day for Contractors across the country.

Revolutionary Pushmatics are interchangeable for rating and type. And there's a Pushmatic to meet every load condition: THERMAL-MAGNETIC and THER-MAL-MAGNETIC with exclusive AMBIENT COM- PENSATING FEATURES. Both are identical in size and contour, in ratings of 15, 20, 30, 40 and 50 amperes, 1 pole, 120 V., or 2 poles, 120-240 V., AC.

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Simple to install; plenty of wiring room

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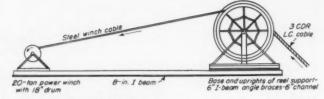
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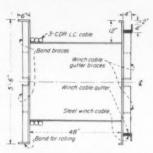
815 Packer Street, Easton, Pa.



**SKETCH OF ASSEMBLED UNIT** showing cable salvage reel, winch, reel saddle and base frame.



CABLE SALVAGE REEL is constructed of steel; has (1) a wide rim for rolling ease, (2) rectangular opening for cable hitch, (3) gutter for winch cable, and (4) rigid radial bracing.



CROSS SECTION OF REEL showing basic design and dimensional data.

The reel is 66-inches in diameter; 48-inches wide (inside dimensions); and holds 600 feet of 3-conductor, 500MCM lead-covered cable. One side of the reel has a 6-inch wide steel band for easy rolling; the other side is equipped with 4-inch by 4-inch welded steel gutter mounted two inches below the reel diameter. Fastened to and wound around this gutter is approximately 600 feet of 4-inch flexible steel winch cable. Both the rolling band and winch cable gutter are sturdily braced by radial steel webs and peripheral cross-braces, Heavy-duty reel saddles constructed of 6-inch I-beam uprights and 6-inch channel braces support the steel shaft around which the reel rotates. Both the saddles and the 20-ton winch are mounted on a base made of 4 by 8-inch I-beams. The winch is driven by a Toledo No. 1 heavy-duty electric power drive.

When assembled for operation, the reel end of the base frame is at the duct manhole—exact location depending upon the actual manhole dimensions. One end of the underground conductor is passed through a rectangular opening (at drum level) in the side of the reel and held secure by U-bolts on the outer side. One end of the steel pulling cable (in reel gutter) is fastened to the 18-inch diameter winch drum.

The pulling technique is simple. As the power drive rotates the winch, the steel cable is wound around its drum. This take-up of the winch cable slowly rotates the special reel in a counterclockwise direction. As the reel turns, it simultaneously pulls the cable out of the underground duct and winds it on the reel drum. At the completion of the pull, the electrical conductor is on the special reel ready to be rolled away or onto a truck; the steel cable is all on the winch drum.

The cable is pulled out of the duct and wound on the reel at a speed of approximately 12 to 15 feet per minute—slow enough for easy handling, yet fast enough to trim man-hours on the job.

Quick assembly and dismantling is another feature of the cable salvage reel unit. Winch and reel saddles can be unbolted in a jiffy and the base frame knocks down into four sections for easy transportation and storage.



GENIAL COMPETITORS in Columbus, Go., are contractors: B. P. Waters, White Elec. Construction Co.; E. Higgins, Higgins-Calloway Co.; and D. Levy, Levy-Morton Co.



As new construction activity lightens, a greater part of your time and effort will be spent in this field - conservatively estimated at \$500,000,000 in 1950.

# ELECTRICAL MODERNIZATIO

To inaugurate a continuing editorial program on this subject, the July issue will carry a 36-page section presenting specific ways and means of operating in the electrical modernization field.

- 1 Markets for electrical modernization. a. An analysis of commercial and industrial electrification problems and the markets they create.
  - 2 Basic considerations in modernization.
    - a. Why modernize?
    - b. Analyzing the existing work.
    - c. Cutting and patching.

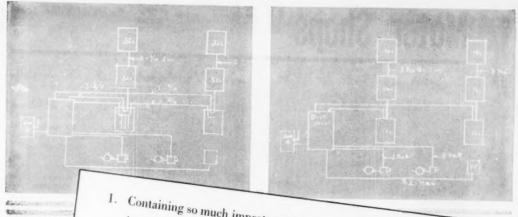
    - d. Exposed work. e. Using structural features.
    - 3 Service entrances.
- a. Type and methods of installing new
  - service entrance equipment. b. Changeover problems and solutions.
  - 4 Distribution Systems.
  - a. Distribution panel modernization.

    - b. Feeders and connections. c. Changeover and salvage problems.
  - 5 Power circuits.
    - a. Panels and circuit protection. b. Types of circuits to use.

    - c. How to install.
    - 6 Motors and Control.
      - a. Selecting modern motors for appli-

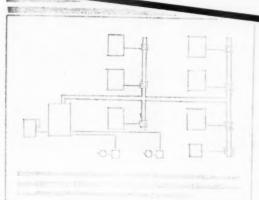
- b. Control applications and how they fit in the modernization problem.
- 7 Branch Circuit Wiring.
  - a. Routing of circuits.
  - b. Effective use of existing raceways.
  - c. Surface extensions.
  - d. Special raceways.
  - e. Switching and control.
  - & Lighting modernization. a. Problems encountered.
    - b. System selection.
    - c. Equipment selection.
    - d. Use of architectural features.
    - 9 Low voltage and special systems.
      - a. Modernizing intercoms. b. Use or replacement of existing cen
        - c. Other signal and communication in-
      - stallation methods.
    - 10 How to Estimate Electrical Modernization Jobs.
      - a. Special considerations on existing
      - b. Use or replace costs.
      - c. Cutting and patching.
      - d. Work in occupied quarters.

BUSG'S



- Containing so much important technical information this July issue will be of lasting reference value to you as you devote more time and effort to electrical modernization.
- Utilities, electrical wholesale distributors and electrical leagues are all keenly aware of the growing importance of electrical modernization and are getting materials ready to help develop this market.
- 3. Many manufacturers will show in this July issue how their products can help you to build modernization business and do modernization work most efficiently.

WATCH FOR this informative issue...





# **Motor Shops**



WOOD GAUGE BLOCKS used as guide when skinning insulation off coil leads. Blocks control length of insulation strip; keep both coil leads identical. Board contains more than 146 blocks of different length and end contour. Note how block is held on coil.

## Gauge Blocks For Skinning Coll Ends

Every operation in the motor repair shop of Giles Armature and Electric Works, Inc., Marion, Illinois, is done in a precise manner—even the skinning of coil ends. There is no guessing as to how far back the insulation should be removed. It is a very definite distance and is determined by a comprehensive set of wood gauge blocks.

The set contains some 146 wood blocks (½-inch square cross-section) varying in length from one inch to 97% inches—graduations being in exactly ½-inch steps. One end of the gauge block is flat and contains a mounting hole; the other end is either tapered, curved, or flat—depending upon the type of coil on which it is to be used. Blocks are mounted to pins on wood backboard for visual identification and reference.

All blocks are numbered and lettered according to the following code:

1-1-inch long

2-11/4-inch long 3-11/4-inch long; and so on to the

longest block.
A—Tapered end
B—Curved end

C-Flat end

Thus, a block numbered "2B" would be 1½ inches long and have a curved end; "2A" would be the same length, but have a tapered end; "2C" would be the same length, but have a flat end. If the leads of a coil were to be skinned for a distance of three inches and the coil contour was angular; gauge block number "17A" would be used.

The gauge blocks are held against the coil leads, between the lead extension and the angular, curved, or square coil end; are held in this position while the leads are inserted in the wire-brush insulation stripper; act as a "stop" when the required length of lead has been skinned. Result: All coil ends are skinned the proper distance and both leads of a coil are identical. It is all part of the high standard of quality workmanship maintained at the Giles shop.

## Jig and Gauge For Training Fan Blades

The motor repair department of Barker-Fowler Electric Company, Lansing, Michigan enjoys a substantial amount of electric fan repair business. Not only do they repair the motors, but also rehabilitate blades, wire guards, and other parts of the fan assembly.

To facilitate blade adjustment, Barker-Fowler fan specialists developed a handy "jig" and gauge. The "jig" consists of a heavy circular steel plate, 13½ inches in diameter and 3 inches thick (an old coupling plate). A center hole accommodates a mandrel on which the blade rotates. Other holes are drilled in the plate with location and spacing corresponding to the correct blade position for different types of fan blades.

To "train" the blade of a fan in the shop for repairs, the center mandrel and three steel pins (for a three-blade fan) are inserted in the proper holes in the plate. The fan is mounted on



HANDY JIG for checking fan blades. Center mandrel and pins shown are for checking spacing of blades. Location and spacing of other holes in plate correspond to dimensions of various types of blades.



CHECKING BLADE pitch with steel gauge set at proper angle for type of blade on jig. If blade does not line-up with bottom of tilted gauge arm, blade pitch is corrected.

# the Name is... FAIRBANKS-MORSE

# Here's "CUSTOMER APPEAL" for You!



# Here's the Axial Air-Gap Motor

Motor users have been quick to add the advantages of the Axial Air-Gap Motor - the motor that is lighter than conventional types by 30% - shorter by over 40%. These advantages add up to a convincing amount of "customer appeal" to anyone interested in a more compact, streamlined and attractive driven machine. Too, Axial Air-Gap Motors offer additional appeals: they have a minimum number of parts, are easy to service and lend themselves to simple mounting - horizontally, vertically or right angle pivot base. Available as polyphase squirrel cage and capacitor start single phase motors - up to ten horsepower - they deserve first consideration for a wide range of applications.

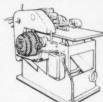


## Send for Axial Air-Gap Motor bulletin!

Bulletin 2760 gives the whole story on Axial Air-Gap Motor design, application and construction. Write or call your negrest Fairbanks-Morse branch office (listed on these pages) for your copy.

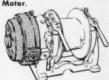
## Where Space, Weight and Appearance Count





Reduced overhang, thanks to the Axial Air-Gap Motor, is a decided asset on this modern saw.

This drum hoist is lighter, more compact through the use of the Axial Air-Gap Motor.



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Totally enclosed fan-cooled motors

# "Pocket Panorama" shows the whole "line-up"

Here in a handy pocket pamphlet are illustrated over 40 types and sizes of Fairbanks-Morse motors and generators. Write or call your Fairbanks-Morse branch office to get your copy.



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# FAIRBANKS-MORSE

# Here's Built-in Longtime Motor Satisfaction



Cross-flow ventilation is another exclusive Fairbanks-Morse advantage.\* It means uniform, symmetrical cooling that eliminates hot spots and prolongs the life of the insulation. Openings are arranged so that there are no exposed moving parts to catch clothing or fingers—a safety factor of prime importance in many installations.

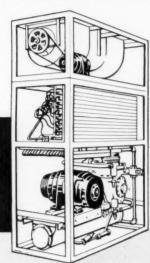
There are many other important features that have made Fairbanks-Morse a name respected wherever motors are used. Ask your Fairbanks-Morse motor specialist about them and you'll find out why, for the broadest range of your motor services, it's best to consider Fairbanks-Morse first.

\*NEMA frames 224 to 365 inclusive



This popular self-contained, water-cooled air conditioning unit has a tenharsepower motor driving the compressor and a one-horsepower motor on the fan. "We have been using Fairbanks-Morse motors for ten years," says the company president," and we have found them highly satisfactary—silent in operation—and they demand little servicing."

This company uses Fairbanks-Morse Motors from 12 horsepower all the way up to 50 horsepower and is one of hundreds of companies standardizing on Fairbanks-Morse, for long-time motor satisfaction:



# Morse

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THE MOTORGEAR

Industry's most compact slow speed unit

Here's a sure, easy way to simplify your slow speed drives. The unique Motorgear combines the modern, dependable Axial Air-Gap Motor with a simple, sturdy helical gear train. The compactness and ease of mounting of the Motorgear make it more easily adaptable to a wider variety of applications. Wherever it is used, the Motorgear improves the appearance as well as the performance of the driven machine. For details write or call your Fairbanks-Morse branch office for your copy of the Motorgear bulletin.



FAIRBANKS-MORSE.

a name worth remembering

#### THESE ARE YOUR

## Fairbanks-Morse

SALES CENTERS

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Export Division: NEW YORK 4, N. Y., 80 Broad Street

the mandrel and rotated until the edges of the blades touch the three pins. If all edges touch the pins, the blades are in correct position. If one edge does not touch the proper pin, its spacing is "off" and it is adjusted accordingly.

Blade pitch is also checked when a fan is in for repairs. After blades are correctly positioned and straightened, the pitch is checked with a simple gauge consisting of two steel straightedges hinged at one end (bottom of gauge is flat so it will rest on the jig plate without tipping over). The angle between the two edges of the gauge is set for the type of blade being checked. This information is provided by a chart compiled over a period of years from experience with all types of fan blades. Once the gauge is set, it is placed on the jig plate with the fan blade between the bottom and top sections of the gauge. If the surface of the blade touches all along the edge of the tilted arm of the gauge, the pitch is correct. Should an air space appear between the blade surface and the underside of the gauge arm, the blade pitch is incorrect and it is adjusted to meet the gauge standard.

Barker-Fowler mechanics can check practically all types of fan blades with this device; frequently discover spacing and pitch of new blades have been shifted during shipment.

## Cleaning Formvar Wire

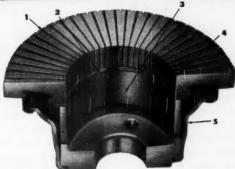
Many motor repair shops have devised numerous methods of cleaning ends of Formvar magnet wire to make coil connections in rewound electric motors. One of the quickest and simplest schemes is used by Phoenix Electric Company of Mansfield, Ohio. R. A. Bonham, co-partner with his father in the business, merely heats the wire to a cherry-red in a gas or torch flame, then dips it into a solution of equal parts of denatured alcohol and water. The conductors come out with a bright shiny copper surface.

To facilitate the operation, a container of the solution is mounted to the stand supporting the gas burner—the same unit used to heat soldering irons.

## Wire Reels Ride On Ferris Wheel

Reels of coil wire are always conveniently accessible and ready for use in the motor repair shop of the Braunlich-Roessle Company, Pittsburgh, Pennsylvania. For they are kept mounted on a rack which rotates on a horizontal shaft and closely resembles in appearance and construction a





The Real McCoy is always best . . . never "just as good." Wagner commutators are best because their rugged design provides extra strength and permits refacing with safety. All Wagner commutators are high speed tested and are built to last. Look at these features:

- 1. Mica insulation between segments.
- 2. A mica washer insulates the commutator from the short-circulting ring.
- 3. Short-circuiting ring is made of brass.
- 4. Bakelite washer insulates the short-circuiting ring from commutator hub to eliminate harmful shaft currents.
- 5. Steel reinforcing shell provides extra strength.

Write for Wagner's new Fast-Moving Parts Bulletin MU-122, and for Motor Parts Catalog MU-40. Every repair shop needs these helps.









mechanic wants and uses tools that make his job easier. Removing and running nuts is one of his most time consuming and tiring operations. That's why the Ingersoll-Rand Electric IMPACTOOL is tops on his list of labor-aiding tools -it makes the tough jobs easy-it eliminates the kick and twist -even if the spindle is stalled completely there is no motor burnout-and it saves as much as 90% on nut running time.

The amazing I-R impact mechanism enables this remarkable tool to be used for many other time consuming operations. In fact,

> when you buy an Ingersoll-Rand Impactool you buy a real multi-purpose tool, one that is limited only by your ingenuity -Call your Ingersoll-Rand jobber or distributor and ask for a free demonstration of this amazing tool.

> > Ratings Size 411—36" bolt dia.

BROADWAY, NEW YORK 4, N. Y.

494.18



ROTATING STEEL DISC in the shop of Pittsburgh's Braunlich-Roessle Company supports 16 wire reels. Easy rotation and shaft lock permits rapid selection of wire and easy positioning for coil winding use.

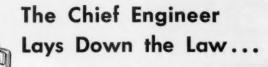
small-scale Ferris wheel. Supported by an angle-iron framework that s bolted to the shop's concrete floor, the central shaft in turn holds a large steel disc, while eight smaller shafts pass through equidistant points on the disc's circumference, each of the smaller shafts holding two wire reels, one on each side of the main disc. Due to the weight of the assembly, it would require considerable manual effort to turn and hold the wheel in position if it were not for a geared crank and a shaft lock. With the geared crank in use, considerable mechanical advantage is obtained, making it a simple matter to rotate the wheel and to position the various wire reels where desired, and the lock holds reels where required until a change is desired. Tension chucks for the wires are mounted on the main supporting frame.

## Infra-Red Oven Has Lamps At Top

Infra-red lamps are being used extensively in motor repair shops for purposes-particularly small work and rush jobs where heatup time for larger ovens proves uneconomical. Lamp arrangement varies with the oven design. Some units have lamps on each side; others have them on the sides and top; others utilize the "ring" principle with lamps arranged in a circle.

At the Central Electric Motor and Construction Co. shop in Battle Creek,

- **Runs Nuts**
- Taps
- Reams
- **Drills Masonry**
- Wire Brushes \*
- **Drives Screws** \*
- **Drives Studs**
- Saws Holes
- Drills Bores Wood
- **Extracts Broken** Studs

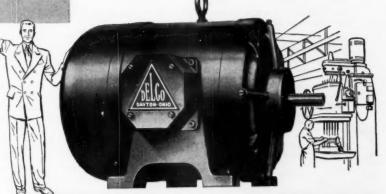


- Pesitioned Bearings
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   Reter and Shaft Assembly
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# Get the Motor that Keeps Machines Rolling

It's on more and more spec sheets—those two important words, "DELCO PRE-FERRED." Because here's a motor built the way production men want motors built: sturdy, rugged, dependable. Just take a look at the performance extras that Delco Motors give you to eliminate machine down-time, cut down motor maintenance.

Want to find out more? You can get complete information by contacting Delco Products, Dayton, Ohio . . . or any of the sales offices listed below.





**DELCO MOTORS** 

DELCO PRODUCTS, DIVISION OF GENERAL MOTORS CORPORATION, DAYTON, OHIO

SALES OFFICES: CHICAGO · CINCINNATI · CLEVELAND · DETROIT · HARTFORD, CONN.



These new back- or top-wired flush tumbler switches give you plenty of performance, profit and reliability. They install quickly and positively. There's no need to bend or loop wire — it goes straight into the unit from the back and is held firmly and permanently by a wire clamp. They're safer, too — there are no exposed wire ends. And they're ideal for use with heavier (10 to 14) wire. Top-wiring with conventional binding screws is optional.

# FEATURES ? HERE ARE A FEW

Double switch blades protected by 2 Bakelite barriers to snuff arcing \* Self-aligning double switch blades give positive connection with solid, one-piece stationary contacts \* Plenty of wiring room in the box \* Switch mechanism is totally enclosed \* One-piece base plate, with washer type plaster ears, is firmly locked into switch cover.

10 and 20 Ampere sizes are available with Brown or Ivorylite handles or as lock-type units; for 1- and 2-pole, 3- and 4-way, and single pole, quadruple break connections.





CEILING OF LAMPS provides heat for this infra-red bake oven. Work is placed on dolly for baking; trapeze bars support armatures, etc. Unit has automatic thermostatic and time clock control.



INTERIOR OF OVEN showing installation of infra-red lamps on sheet steel "ceiling". Open space above contains asbestos-covered circuit conductors.

Michigan, the infra-red lamps are mounted at the top of the oven—providing a ceiling of heat that radiates downward. A total of 32 lamps, in alternate rows of four and three lamps each, are mounted to a sheet steel "ceiling" supported by channel-iron cross-pieces. There are four 120-volt lamps in series on the 440-volt service. Series-parallel grouping provides four circuits of eight lamps each, all automatically controlled by thermostat and time clock. Maximum attainable temperature is approximately 350°F.

The oven is 48-inches deep, 57½-inches wide and 63-inches high; is constructed of an angle-iron frame with 2¾ inches of insulation between sheet steel interior and exterior panels; has two hinged doors and natural draft ventilation. The unit can accommodate up to a 300 hp., 1800 rpm., stator.



# Rice Hotel REMODELS and SAVES with Low Impedance Bus Duct

While the basic advantage of using bus duct is to secure more adequate secondary power distribution, the choice of bus duct should not stop there.

Take the case of the installation limitations at the Rice Hotel, Houston. The problem: to completely remodel and air condition from basement to penthouse—and without interruption of "business as usual".

The answer: Westinghouse Low Impedance Bus Duct. Its compact design and freedom from protruding members permitted passage in places where dimensions were critical. Limited space, because of pipe and air duct systems, ruled out ordinary wiring, as well as other makes of bus duct.

Ask your nearby Westinghouse representative to tell you all the advantages of Westinghouse Bus Duct, available in four popular types. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.



# America's Most Admired Fixture!



Illumination PLUS
Point-of-Sale Merchandising
Wins New Friends for

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## **VL and NHC Series**

#### LEADER VL-440 SPECIFICATIONS

Housing, channel and deep drawn end caps of 20 gauge sleel, finished in white, highgloss baked enamel. Extruded tubular side panels and moulded one-piece louver is of glowing white plastic that is warp-proof, colorfast, and destaticized. Louver swings down for easy servicing. Choice of 31 or 45° shielding. May be used as single units or in continuous runs-suspended or ceiling mounted. VL Series uses 2, 3 or 4 40-watt 48" T-12 lamps. Wired units include UL and ETL approved sockets, type FS easily replaceable starters and two high p.f. 2-lamp ballasts. Conventio 110-125 volts, 60 cycle A.C. Other voltages on request. NHC Series available for use with Slimline tubes and for 120, 200, 300 or 425 milliampere operation in lengths from 48" to 96".

You'll find this attractive fixture installed in the most tastefully decorated offices, stores and office buildings. The "Officer" not only adds to any decorative effect, but helps sell goods and services through appealing highlighting of floors, furniture and display sales material. The LEADER "Officer" is rich in construction, too. For example, it is provided with the famous LEADER one-piece louver of destaticized plastic... a louver with a multitude of small, rigid apertures—made possible by one-piece molding—to provide excellent shielding and soft, gracious light-diffusion.

Sold and installed only by the better electrical wholesalers and contractors

IlAAll/America's No.1 Lighting Equipment Manufacturer

LEADER ELECTRIC COMPANY . 3500 NORTH KEDZIE AVENUE . CHICAGO 18, ILLINOIS

# **Modern Lighting**

## Lighting Variety With Fluorescents

The flexibility of fluorescent lighting is demonstrated in an effective manner in the Bulova Watch Company's office and repair shop located in New York City's Rockefeller Center. A variety of commercial fixtures are employed in both private and general office areas to provide illumination in widespread patterns for general lighting and concentrated treatments for critical seeing. Built-in treatments are used also, including indirect cove installations and back-lighting fluorescent sources in conjunction with glass block and opal panels. The resultant installation stresses architectural expediency in the swank reception room, a combination of beauty and medium lighting intensities in private offices, and high-intensity functionalism in areas devoted to the repair of fine watch mechanisms. Fluorescent lamps are predominantly white. However, both 20 and 40-watt lamps are used singly, in pairs and as 4-lamp units. Throughout the office and shop space, ease of maintenance is of prime importance and, towards this end, fixture housings are hinged, and built-in installations are readily accessible for cleaning and relamping.

Three separate lighting treatments are utilized in the reception room. Directly above the receptionist's desk, a circular opal panel shields a 250watt incandescent floodlamp that effectively raises the footcandle level on the desk surface without altering the atmosphere of restful comfort throughout the area. A single row of 24- and 48-inch fluorescent lamps, mounted behind the upper lip of walnut veneer wall panelling, indirectly illuminates the ceiling, while a bank of fluorescent lamps located above and behind a glass block partition adds sparkle to the room, increases the illumination on the receptionist's desk, and highlights the translucent face of an attractive, modern wall clock,

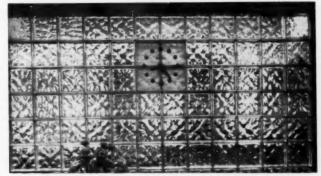
Three treatments are also employed in private offices, although all three utilize fluorescent lamps. Circular opal panels above desks conceal closely-spaced lamps, producing high-intensity white light; surface-attached Holoflux units bend light downwards to provide maximum illumination over useful areas while eliminating glare at normal viewing angles; and single strip



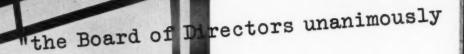
**GRUBER MOLDED** lens panels are used in general office areas in conjunction with Holoflux surface-mounted and recessed units.



**REPAIR BENCHES** are illuminated by semi-cylindrical fluted-glass units mounted continuously between structural beams.



**BEHIND THE** receptionist's desk in the Bulova Watch Company's **New York** City office, a glass-block partition with a translucent wall clock is back-lighted by multiple rows of end-to-end fluorescent lamps mounted above the upper limit of the blocks.



No wonder PLEXIGLAS lighting wins approval. It provides glarefree, shadow-less illumination wherever installed, from Directors' Rooms to housewives' kitchens. The full output of the lighting source is evenly diffused across the surface of this highly efficient acrylic plastic. Result: A luminous atmosphere notable for low brightness contrast and high visibility.

PLEXIGLAS aids design and installation, too. Lightness and strength mean easy erection with fewer, lighter supports. Resistance to breakage and discoloration assures low-cost maintenance. And the variety of translucency-grades in flat, patterned, or corrugated material, coupled with the ability of PLEXIGLAS to be formed readily and economically to almost any desired shape, gives almost unlimited scope to fixture design.

PLEXIGLAS is used for both diffusion and reflection of light in the General Electric Company Board of Directors' Room, New York City. White translucent panels in the 9-foot-square fixtures diffuse perfectly the light from 18 slimlines mounted only 2½" from the acrylic plastic surfaces. Lightly sanded on the outside, the panels also act as diffuse reflectors for indirect lighting from hanging fixtures that are used when the main lighting is not needed. Fixtures designed and installed by The Frink Corporation, Long Island City, New York.

approved the New PLEXIGLAS Lighting ... "



PLEXIGLAS ceiling lighting fixtures in the Directors' Room of Cleveland's Bank of Ohio produce an average illumination of 75 footcandles on the conference table. Each fixture measures approximately 6 x 8 feet and consists of four corrugated bottom diffusing panels with curved side panels formed from 12" strips of flat material. Ten 96" 300MA G.E. Slimline and two 40-watt fluorescent lamps (mounted at right angles at the ends of the Slimlines) illuminate each fixture. All lamps are 3000°, Fixtures installed by Bell Electric Company. Design consultants: W. E. Conley, General Electric Co.; John Liston, George S. Rider Co.; W. A. Mize, Cleveland Electric Illuminating Company.

## TELL US ABOUT YOUR PROBLEM

We will be glad to work with you on specific lighting applications. Write us today. Let us show you how PLEXIGLAS can provide the best answer to your lighting problem.

PLEXIGLAS is a trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries.

CHEMICALS



FOR INDUSTRY

## ROHM & HAAS

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Canadian Distributor: Crystal Glasa & Plantics, Ltd., 282 St. Helens Avenue, Toronto, Oni.



- Designed in collaboration with America's largest builders...for quick, easy, inexpensive installation.
- New FASCO Turbo-Radial propeller, specially engineered for pressure through ducts... develops pressure unobtainable with ordinary fan blades... three-speed control.
- Unique air intake prevents air re-circulation at inlet.
- Outside wall cap—aluminum

   rustproof—has built-in balanced louvres. Overhang keeps out rain, drafts, cold.
- Beautifully designed . . . superbly finished . . . priced right.

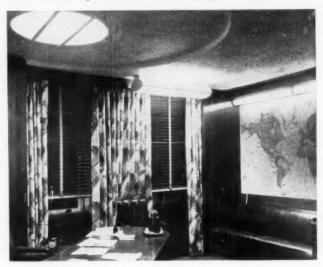
FASCO wall ventilators are used by America's largest builders . . . 15,000 IN LEVITT HOUSES ALONE! The new FASCO "CEIL-N-WALL" vent will be a leader, tool

WRITE, WIRE or PHONE for complete information. FASCO Industries, Inc., 30 Union St., Rochester 2, N.Y. (Phone HAmilton 1800).





**GENERAL ILLUMINATION** in the reception room is provided by a fluorescent cove treatment mounted behind the upper lip of walnut veneer wall panelling, while concentrated illumination is focussed on the receptionist's desk by an incandescent floodlight unit behind a circular opal-glass ceiling panel.



A TYPICAL private office utilizes fluorescent lighting in three treatments. Above desk surfaces, circular opal-glass panels conceal closely-spaced lamps; wall maps are illuminated by single-strip units combining semi-cylindrical fluted glass enclosures; and Holoflux luminaires direct light downwards for utilization and upwards to minimize brightness ratios between ceiling and fixtures.

semi-direct units above wall maps and murals illuminate vertical surfaces through semi-cylindrical fluted diffusion glass enclosures.

In general office and repair areas, the semi-cylindrical fluted-glass units are utilized in continuous rows, and Holoflux fixtures are employed as recessed units and as surface-mounted luminaries with upper refracting panels for reducing the contrast of brightness between units and ceiling,

and to soften shadows. Also used in these office sections are 4-lamp 40-watt molded lens panels manufactured by Gruber Brothers, directing light downwards for office utilization, and outwards for general lighting and reduction of brightness ratios.

This modern lighting, combined with tasteful furnishings and air conditioning, results in an atmosphere which is productive of employee morale and accurate productive labor.

# GEORGIA TECH

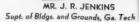
#### THE BILTMORE 5500

Ideal for schools and public buildings where high intensity lighting must be obtained at low cost. The most efficient louvered fisture on the market—85.5% by Electrical Testing Laboratory analysis. Available in 430 MA 48" or 76" lengths.

## THE HIGHLANDER 5200

Used where beauty is a major consideration. Finished in natural satin aluminum; white enamel louvers with franslucent side panels of Polystyrene. Lew unit cost. Nearly 80% efficient. Available in 430 MA 48" and 96" lengths.

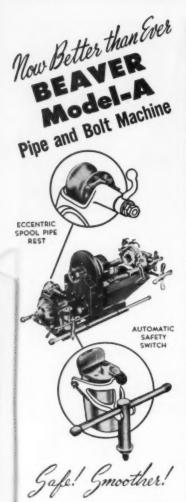




More and more modern schools are being built, and old buildings renovated. One basic factor receiving major attention is planned lighting with quality fluorescent fixtures. That is why many schools and colleges-and technical institutes such as Georgia Tech-are installing Gibson fixtures. All components of Gibson fixtures are E. T. L. approved, and individually lamp tested before shipment. The two fixtures recommended for school installations are sturdily constructed from 20 gauge cold rolled steel or heavier, finished in the finest hot-bonded synthetic enamels, and attractively louvered.

As a free service, Gibson representatives will study school buildings, and map out a plan for lighting for maximum visual health and comfort, without cost or obligation to you of any kind. For more information on Gibson Planned Lighting, write us





Two new improvements—patents pending—have been added to further increase the safety, convenience and performance of the Becver Model-A 1<sub>th</sub> to 2" Pipe 6 Boit Machine—popular the world over for the past 19 years.

I. The new Automatic Switch Lock and Chuck Wrench holder makes it impossible to start the machine without removing the chuck wrench. This protects both workmen from injury and machine from damage. A highly important Safety Feature.

The new Focastir Social Pipe Centering

highly important Safety recture.

2 The new Eccentric Spool Pipe Centering Device is detached from the rotating spindle—prevents the whip of long revolving lengths of pipe from rocking the spindle and causing litar-sided, leakly threads.

And don't forget—there are 192 different kinds and sizes of dies available, in stock, for your every requirement when you buy a Beaver Model-A. This die inventory represents an investment of more than \$150,000—to insure immediate user service. Sold by leading jobbers—

Write today for new Beaver Catalog No. 50.
Address Beaver Pipe Tools, Inc., 232-300 Dana
Avenue, Warren, Ohio, U.S.A.

50 Years of Friendly Service

BE WER



Dropped central ceiling in Brody's Comfort Shoe Store, Newark, N. J., conceals reverse-cove installation of end-to-end 40-watt white fluorescent lamps. Recessed Hi-Hat 150-watt floods create average intensities of 58 footcandles.

## Reverse Cove Illumines Walls

Brody's Comfort Shoe Store in Newark, New Jersey, employs two types of lighting. The first is fluorescent, with 4-foot 40-watt white lamps mounted end-to-end in single lamp channels manufactured by Litecraft. Channels are positioned behind the outer edges of a central dropped ceiling that stops a foot from all walls. Upper walls, above the elevation of this acoustically-tiled ceiling, curve inwards to form a continuous plaster reflecting surface for the white light. With light illuminating this plaster area as well as the walls beneath, an impression of width is created in the store area which is relatively narrow towards the rear of the sales area. Fluorescent lamps are set behind the most acute line of vision so that patrons are not annoyed by source brightness.

The second source is incandescent, with recessed Hi-Hat fixtures equipped with 150-watt R-40 floodlights (also manufactured by Litecraft) mounted above the dropped center ceiling panel and the glass-enclosed show case to the right of the main entrance.

Additional show cases, recessed into the salon walls, depend upon a single overhead line of fluorescent lighting to illuminate merchandise niches.

Footcandle intensities range from an average of 30 in the side area occupied by the chairs, to an average of 58 in the central sales area where shoes are actually exhibited and examined. Brightness values range from 5000 (accent lighting) to 9 foot-lamberts between fixtures on the ceiling. Niches are measured at 3700 while floor coverings are in the order of from 8 to 11 foot-lamberts.



ACCENT LIGHTING on merchandise, with 100 footcandles at point of sale, is provided at MacManus' store, Washington, D. C., by 150-watt R-40 spot lamps louvered and recessed in suspended canopy ceiling. Fluorescent lamps are used in wall display niches and in cove formed by suspended canopy, to provide 50 footcandles of general illumination throughout store. Lighting installation was sold and installed by Silverberg Electric Co., electrical contractors in Washington.

# You can be SURE.. IF It's Westinghouse



No wonder he's worried. He's picking "fixtures". You know fixtures won't solve lighting problems—but how many other people do?

It takes more than a luminaire to solve a lighting problem. It takes expert planning in the application of this equipment to give you the BEST BUY IN LIGHTING.

This calls for the services of a qualified lighting engineer.

Whether you plan lighting, buy lighting, or install lighting, the services of a Westinghouse Lighting Engineer are available to you.

J-04282







TRADE PRICES

GAS FILLED CYLINDER \$7.95

2 BURNERS—FIXED FLAME,
ADJUSTABLE FLAME ee. 5.00
FILLED CYLINDER WITH
BOTH BURNERS

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CLEANS OWN ORIFICE IN 30 SECONDS! ...refills easily obtainable ...clean, nonexidizing, non-carbonizing flame ...longburning ... many other outstanding features ...li's the Torch of the Century!

APPLICATIONS: Soldering • melting lead or babbitt • tinning • light braxing • freeing frozen nuts • dozens of other laber-saving applications where electricians need an intense, portable controlled flame.

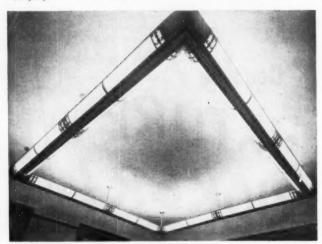
ORDER THRU YOUR JOBBER

OTTO BERNZ CO.

TORCHES . FIREPOTS . PLUMBERS TOOLS



HOLLOW SQUARE of Guth Cadet units, each unit mounting two low-brightness 100-watt fluorescent lamps, produces average illumination of 42 footcandles on desk of Frederick Frei in Paterson office of Public Service Electric and Gas Company.



**SPECIAL MITERED CORNERS** were provided by Guth to improve general appearance of installation which was accomplished by Electrical Contractors J. W. Broadfoot Company, Inc., of Paterson.

## Semi-Indirect Guth Fixture Lights Office

Comfortable low brightness illumination is provided in the private office of Frederick Frei, Public Service Electric and Gas Company, Paterson, N. J., by the installation of a hollow square of suspended fluorescent units The units, Guth Cadets, mount two 100-watt lamps in each 5-foot fixture, and two fixtures are mounted end-toend to form each of the four sides of the suspended square. Special decorative mitered corners were provided by the manufacturer to improve the general appearance of the installation. An average illumination of 42 footcandles results on the surface of the desk. De-

signed by the Lighting Department of the Public Service Electric and Gas Company, the installation was by the J. W. Broadfoot Company, Inc., electrical contractors of Paterson.

Repainting also played an important part in the modernization of this office, for bright treatments of trim and dado added materially to the impression of size and footcandle values were increased. Other improvements (contemplated after the top picture was taken) included lighter finishes for office furniture and the installation of a light matte low-reflectance working surface for the desk.

## There is NO SUCH THING as an "RLM TYPE" Lighting Unit!

Either it is RLM CERTIFIED or it is NOT. The Only Way To Be Sure Is To

## M LABEL!









Looks can be deceiving in lighting units, too! A lighting unit may LOOK like an RLM Unit, it may have a similar outward appearance, contour, shielding angle, etc. -but unless it is made in accordance with RLM Standard Specifications and carries the RLM Label, it is not an RLM Lighting Unit. There is no such thing as an "RLM Type" that does not have the label

Why No "RLM TYPE"? The RLM Label on fluorescent and incandescent lighting units. not only assures the buyer of design and construction that meets certain minimum standards\*, but also provides him with a WARRANTY OF UNIFORM QUALITY.

Only those products of lighting manufacturers which are consistently proved to be of uniform quality and meet the published specifications of the Institute are permitted to bear the RLM Label. This uniformity of quality is of exceptional importance to all those who buy, use, specify, recommend

or sell lighting equipment. It is essential to uniformly satisfactory lighting equipment performance, that each unit in the

system perform with equal efficiency to the other . . . that ballasts function with uniform efficiency...that the reflection factor be uniform from unit to unit...that the units be of uniformly durable construction with the identical-gauge steel and the same thickness Porcelain Enamel. Such uniformity reduces to a minimum the plague of spotty performance by individual units in a lighting system.

**How RI.M Checks Uniformity of Quality** According to the RLM testing and inspection procedures, representatives of the Electrical Testing Laboratories periodically visit plants of all RLM member-manufacturers. They take lighting units right off the assembly lines and out of stock for testing and inspection at their laboratories. They may also obtain test samples directly from the distributors' shelves

This Advertisement is published in the Interest of the Entire Lighting Industry by

or out of contractors' stocks in order to check Uniform Quality at every level of distribution.

This activity of the RLM Standards Institute, which makes possible the Warranty of Uniform Quality, is not duplicated by any other agency in the lighting industry. That is why there is no such thing as an "RLM Type" Lighting Unit.

## FREE SPECIFICATIONS BOOKLET! This



up-to-date 36-page booklet tells why it is important to SEE THE RLM LABEL before buying or specifying lighting units. It contains all RLM Specifications, covering vital construction and performance factors that

should have major consideration by the buyers and specifiers. It is an indispensable help in the sale of industrial lighting units. For your

complimentary copy (or copies), sent without obligation, write:

RLM Standards Institute, Suite 819, 326 West Madison St., Chicago 6, Illinois

# RLM STANDARDS INSTI

## \*Every RLM Unit Must Conform with Certain Minimum Standards such as these:

Porcelain Enamel Reflectors - all RLM Inits must have a specified thickness of Genuine Porcelain Enamel fused to steel. This unsurpassed high-reflection, highdiffusion reflecting surface is the only commercially available finish that cannot deteriorate or corrode. Simple soap and

water cleaning quickly restores it to watts to the lamp. Because of their high original efficiency

High-Quality Ballasts - RLM Fluorescent Units must be equipped with Certified Ballasts which prevent high-temperature ballast operations, supply proper starting current and maintain proper operating

power factor, present wiring capacity can be utilized most efficiently.

Reflector Design - every RLM Unit must conform with the most accepted principles of Illuminating Engineering. Such design protects the workers' eyes while

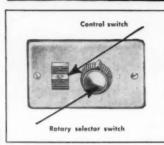
delivering, not only the most light per dollar, but also the required quality of light for the individual seeing task.

Sound Construction - RLM Units must comply with high fabrication and materials to insure standards of maximum resistance to sag, distortion and breakage, R:4001



## WIRING NEWS

A PERIODICAL DIGEST OF WIRING IDEAS FROM THE GENERAL ELECTRIC CONSTRUCTION MATERIALS DEPARTMENT



## Master Selector Switch Increases Versatility Of Remote Control!

Here's the newest addition to General Electric's step-saving remote-control wiring system—an addition that affords a wide variety of new applications. Replacing gangs of separate ON and OFF controls, this compact master selector switch provides instant, positive control of up to 9 different circuits—and, very simply, too!

To Control Individual Circuits
Turn rotary selector switch to the desired
circuit and then press the control switch
for ON or OFF.

To Control All Circuits

Merely press the control switch ON or OFF while rotating the selector switch through all nine positions.

Plan to use it for one-panel control of large plant areas... for sure, certain emergency light control in warehouses, banks, office buildings... for pathway lighting through yards and wharves... or wherever else one-point, multi-circuit control is needed.

The G-E master selector fits all standard mountings for flush devices.

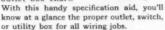
Stop in at your local General Electric distributor's and see the entire remote-control system—he'll be glad to demonstrate it for you. Or, if you prefer, check box (A) in the coupon below for complete literature.

## Can You Afford To Save On Switches?

Why gamble? Replacements and service calls often cost many times the small savings made on lower-grade switches. So, when your plans call for switches, insist on high quality, long-wearing General Electric specification-grade switches.

## Free Guide Speeds Box Selection

To make your next layout job an easy, certain one, General Electric offers a free switch and outlet box chart.



Printed in color and carefully illustrated, this new Box Buyer's Guide shows the dimensions of all standard boxes. It gives the number of conductors—by wire size—permitted by the National Electrical Code for the various box sizes and types. And, for easy reference, there's included the section of the National Electrical Code covering box sizes. Send for your copy today—just check box (B) in the coupon.

## No Weak Spots in Wet Spots

For wiring in locations where water and dampness present a problem, your best bet is General Electric Flamenol<sup>®</sup> Type TW wire.

Tough, thermoplastic-insulated General Electric Type TW takes rugged jobs in stride. Use it in raceways or conduit laid in concrete or masonry...for machinery wiring in damp or humid atmospheres... for conduit installations of all kinds.

Flamenol Type TW is easy to pull, clean to handle. In addition to its flame- and moisture-resistant qualities, the Flamenol insulation is highly resistant to oils, acids, and alkalies.

For more information on Type TW, check box (C) in coupon.

## Quality Pays Off In Protection

For locations where severe atmospheric corrosion or moisture is present, G-E white rigid conduit is still the old standby. Made of fine-quality steel, G-E White is hot-dipped galvanized, and further protected by a glass-smooth Glyptal® finish, inside and out.

The carefully controlled manufacture of G-E White provides conduit that is reliably uniform. The interior surface is smooth for speedy wire-pulling. Threads are sharp and clean-cut for easy connection. Consistent wall-thickness facilitates on-the-job threading and cutting.

In interior installation and where not subject to severe corrosive influences, use G-E Black Conduit. On many jobs, G-E Black will give you many economies. Try these two fine General Electric products the next time you buy conduit.

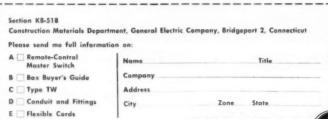
Remember, too, that General Electric supplies a complete line of fittings and accessories. Order them along with your conduit and avoid the costly annoyance of mis-matching and poor-fitting materials on the job. For more information on conduit check box (D) in the coupon.



## Tough Cords for Rough Jobs!

Whether it's for a powerful portable saw ... heavy-duty paint sprayer ... or light floor waxer—specify "General Electric" on all your flexible cord replacements. You'll appreciate the way G-E cords make it possible to operate equipment efficiently long after other cords become useless.

G-E flexible cords are made in a variety of types and sizes for medium- and heavyduty use. Look into their advantages the next time you make a cord replacement. For further information check box (E) in the coupon below.



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The Editor, ELECTRICAL CONSTRUCTION AND MAINTENANCE 330 West 42nd St. New York 18, N. Y.

We suggest that you tear out the bottom eard before you start reading the following pages. Keep the card handy. You might even use it as a book mark in case you are unable to complete reading the following pages at one sitting. Then, as you see some new products about which you want to know more, just circle on this card the number which appears at the top of the item describing the new product or catalog. Circle each number on this card which corresponds to the number on the item in which you are interested.

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Electrical Construction and Maintenance is written for you by a large staff of editors and consultants, each an authority on some phase of the business. They will be glad to give you expert advice and answers to your questions.

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Reader Service Department ELECTRICAL CONSTRUCTION AND MAINTENANCE 330 West 42nd St. New York 18, N. Y.

## USE THIS CARD TO ASK THEM!

Do you have a problem in wiring layout, motor control, lighting technique? Ask the editors.

Do you want advice on cost analysis, billing procedures, market conditions, or government regulations?

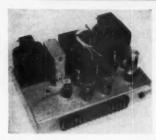
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## **Product News**



## Power Amplifier

A new power amplifier designed for low-cost operation on high-power industrial and commercial sound systems has been announced. The new two-stage bridging power amplifier, Type MI-12188, features inverse feedback control and a voltage-regulated power supply. It will provide frequency response from 30 to 15,000 cycles, with low distortion. Unit will supply 70 watts to any one of several load impedances when bridged across a line of 3.3 volts RMS maximum. It operates from a 105-125 volt, 50-60 cycle power supply. Normal power consumption is 240 watts. It can be mounted in standard RCA cabinets, or in standard cabinet racks on shelves. Connections are made to a screw-type barrier terminal board.

RCA Engineering Products Department, Camden, N. J.



#### Kitchen Fan

Announcement has been made of a new home kitchen "Filter-Fan" that traps and eliminates greasy cooking vapors. It is available in four different styles to suit all types of home kitchen construction. It consists of two main units; a life-time washable filter and a centrifugal blower. Ample 14¼ inch by 10½ inch filter traps grease and dirt before it can enter the fan unit. The all-metal, remov-

able filter unit is cleaned by immersing it in hot, soapy water. Blower unit has a heavy duty, self air-cooled electric motor and a centrifugal squirrel cage blower wheel. Motor connects into 110-volt home electric circuit, 50 or 60 cycles and is cushion mounted to minimize noise and vibration. Motor and fan can be installed after plastering is finished.

Marvin Manufacturing Company, 3071 East 12th Street, Los Angeles 23, Calif.



FLOODLIGHT and swing-over bracket, Type VE-18, is available. Unit is a 750-1500 watt open type, all porcelain floodlight suitable for general area lighting, playgrounds, construction areas, service stations, minor sports areas, etc. New bracket is available to extend sing-over feature to all bayonet heel construction floodlights. Manufactured by Westinghouse Electric Corporation, Pittsburgh 30, Pa.

## Splice Caps

Splice caps with insulators are now available for pigtailing wires from Nos. 14 to 6. Splice cap is installed and secured by means of crimping tool having four uniformly converging plungers, which draw splice cap and inserted wires into solid permanent mass. Installed cap is insulated by pushing molded insulator over splice cap and turning up red security ring to lock insulator in place. Approved by Underwriter's Laboratories, Inc. and Canadian Standards Association for usage in circuits to 600 volts.

Buchanan Electrical Products Corporation, 1290 Central Ave., Hillside, N. J.



### **Outlet Box**

(3)

(5)

A new 31 in. "Redege" octagon outlet box has been announced. Designated as catalog No. 2963, the box is equipped with two all-purpose clamps to accommodate armored cable, non-metallic sheathed cable, and flexible tubing in connection with opentype wiring. It is 11 inches deep, and is approved by the Underwriters' Laboratories, Inc. It comes with four cable knockouts and one 1 inch knockout in the back. There are two 1 inch conduit knockouts, one on each of two sides. No fixture stud is provided, but the 1 inch knockout in the back may be opened for a stud to be applied on the job.

National Electric Products Corp., Chamber of Commerce Building, Pittsburgh 19, Pa.



Instrument

(6)

A new model Mini-Volt voltmeter featuring an expanded scale centered on the common 110 and 220 line voltages has been announced. It is known as Model 410A and is accurate to within 2 volts at 110 volts ac. All features of the Model 400B Mini-Volt are retained in this new model. Practically burnout proof operation is assured by the glow-lamp indicator which is guaranteed for 25,000 hours' operation minimum. 12 inch flexible test leads are tipped with heavily insulated testprods.

Industrial Devices, Inc., Edgewater, N. I. Modern Fittings Gor

•thinwall conduit •rigid conduit •metallic and non-metallic cable steel conduit

· flexible cable \*grounding devices \*lighting service entrance fixture fittings

manufacturers for over 30 years representatives in principal cities

midwest Sold Through Electrical Wholesalers midwest electric mfg. co. • 1639 walnut st. • chicago 12, ill.



## Slide Rule

Announcement has been made of a new slide rule, called Datarule, for redesign of coils and motor windings. In making any type of change in the coils or winding, whether in the form of frequency, voltage, number of turns, connection, speed or size of wire, or in testing or determining the effect of such a change in existing design, the Datarule indicates the effects of such change on the other related factors in coil or winding design. Rule is 1 inch in length by 2% inches wide and constructed of clear plastics sheet. It has four fixed scales and two scales on the slide, with hairline of transparent vinylite. Special features include the finder table appearing at the bottom of the face of the rule, and reverse scales are printed in red to simplify reading.

Brownell Distributors, Inc., 308 Canal Street, New York 13, N. Y.



## Ballast

A new "Trigger-Start" ballast for instant starting operation of residential fluorescent lighting has been announced. They are designed to operate the standard 20-watt fluorescent lamps and the standard 32-watt circline fluorescent lamps. Instant-start characteristics is obtained by cathode header windings which heat the cathodes to the point where the open circuit voltage of the ballast is sufficient to strike the arc. Listed by Underwriter's Laboratory, ballasts can be used in a wide variety of household lighting fixtures. They are designed for single-lamp operation only.

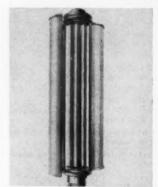
General Electric Company, Schenectady 5, N. Y.

### **Electric Hammer**

The new "Super-Slugger" electric hammer has been announced. It weighs 7½ pounds. Useful for channeling in concrete, star-drilling entry holes for conduit or mounting holes for anchors and electrical equipment, cutting out sheet metal. It eliminates direct vibration on the motor armature and other working parts.

Noble & Stanton, 1040 Broadway, Bedford, Ohio.





FLUORESCENT ISLAND LIGHT has been developed by Guardian Light Company, 301 Lake Street, Oak Park, III. Fixture has hinged glass frames. Ballasts are high power factor, instant start type. Six 40-watt T-12 instant start, high humidity lamps are included with unit, which measures 59 inches high and 9-3/6 inches in diameter. Listed by Underwriters' Laboratories, Inc.

### Photoelectric Control

Photoelectric control Series 20 is designed for general industrial and machinery application. It is available with phototube integral with the control or located in a separate small housing for applications where space is limited. It is supplied with forward and reverse circuits so that tube replacement is indicated by either an energized or de-energized relay. Terminal panel connections provide for operation from 115 and 230 volt supply. A tamper-proof sensitivity adjustment permits positive operation over varying distances between phototube and light source. They are designed for high-speed operation. Relay operated in 1/20th of a second. Operates on 115 and 230 volts, 50-60 cycles ac, double-pole, double-throw relay.

Photoswitch Incorporated, 77 Broadway, Cambridge 42, Mass.



#### Loom Switch

(12)

A new pushbutton operated loom switch is available for the textile industry. It is manually operated by means of pushbuttons. The lint-proof enclosure has a close fitting cover to protect against entrance of lint and dust. Positive make, quick break operating mechanism is built on a steel framework. Overload protection is provided by the eutectic element overload mechanism that is closely calibrated to assure accurate protection without unnecessary shutdowns. The entire mechanism is mounted on a steel base plate which in turn "floats" in live rubber mounting bushings. Rated for polyphase motors up to 2 hp, 220 to 660 volts.

Cutler-Hammer, Inc., Milwaukee,



## Lift Gate

A new light weight, "freight elevator", known as a "Pick-Up" lift gate, which attaches to the rear of any 1 and I ton pick-up truck has been announced. Lift gate operated by two powerful hydraulic hoist cylinders makes it possible for the driver alone to lift or lower or stop and hold at any height as much as 800 pounds. It makes it possible for him to load or unload heavy awkward or frail commodities at curb level or ground level. The single lever safety control prevents merchandise damage and stops resulting provoking delays and claims. Anthony Company, Streator, Ill.

(13)



# NEW CODE CALL FOR INSTANT COMMUNICATION



ers, whistles and lamps. Promptly completes tele-

phone connections with organization personnel away from their own telephones.

Eliminates time waste of telephone operator and other employees in "man-finding."

Enables employees without telephones to answer nearest telephone.

Write for New Bulletin B4-3.

## FIRE ALARM SYSTEMS

Several of the Wheelock achievements which are singular contributions to progress in interior fire alarm system manufacture are the engineering and development of the Alternating Current Fire Alarm System . . . the Solenoid Underdome Bell . . . the patented Automatic Master Code Fire Alarm System, and the patented March-Time Fire Alarm System (continuous ringing) with single stroke instead of vibrating bells or horns.

Systems fully supervised including coding contacts which give immediate notification of trouble that may occur on circuits.

Non-Code, Break Glass (Hinged Hammer).

Available in two general types: NON CODE, and CODED Systems, with many possible modifications.

No. 3-3 Catalog upon request



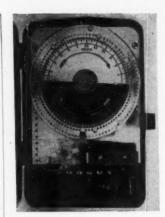
Coded, Pull Lever showing completion of downward pull.



Typical Control Panel.

Handled by Leading Distributors

Also RELAYS and SIGNALS REG. U.S. PAT. OFF. SIGNAIL
ENGINEERING & MFG. CO
154 WEST 147 ST. NEW YORK IL NO



Time Switch

(14)

A new cycle time switch with 48 on and off operations has been announced. Cycle-Master is set by the insertion of screw pins in the programming dial. Intervals may be 15 minutes or more apart when used on a 24 hour cycle, seven and one-half minutes on a 12 hour cycle, and as little as 37% seconds when used on an hour cycle basis. Eight pins are supplied with each unit. Series 70 Cycle-Master has a capacity of 10 amps. on a 110 volt, 60 cycle ac circuit; series 80 has a capacity of 20 amps. Both series are available in models with or without Sunday and holiday cut-outs, SPST through DPDT, and with four, five or eight terminals, depending on contact arrangement.

Automatic Electric Manufacturing Company, Mankato, Min.



Service Equipment

(15)

New 100-ampere outdoor service equipment permits increased capacity for service requirements while still providing dependable protection offered by magnetic principle of operation. The 16-gauge corrosion-proofed steel box is finished in gray alcoloid resin enamel and is weatherproof. It may be sealed by power company so that it is tamper-proof, and cover over circuit breakers can be padlocked by the user. Overall height is 14½ inches. Current-interrupting device in enclosure is magnetic circuit breaker, which trips instantly on short circuit but delays trip on starting surge or on a minor overload for a pre-determined period of time. If breaker opens, user unlocks the cover and restores current by pushing handle to "on" position, without breaking seal on enclosure itself.

Heinemann Electric Company. Trenton, N. J.



### Connector

A new heavy duty two-bolt cable connector, known as Penn-Tap, has been introduced. It is recommended for taps and splices, service entrance connections, dead ends, etc. indoor or out. It is installed with an ordinary wrench, and is self-locking, holding tight permanently. Listed by Underwriters Laboratories. It is a one-piece fitting, swiveling on one locked bolt. Recessed bolts assure easy taping. Take cables from 10 str. to 1,000 MCM. Penn-Union Electric Corp., Erie, Pa.

#### **Blow Torches** (17)

Announcement has been made of a new line of blow torches. The handy half-pint torch is for light shop work. It is designated as No. 59 for gasoline and No. 60 for alcohol and is complete with soldering iron rest and windsield. This model has the same design characteristics as regular heavy-duty torches. The 31 inch diameter tank is brass and holds 74 oz. of fuel; torch burns 31 hours full open and attains a temperature of 1700°; bottom is concave to facilitate filling. Pressure is maintained by a brass wire interwoven with wick which conducts heat from burner to tank.

Turner Brass Works, Sycamore, Ill.



the ONE answer to every troffer need

From 10 years' experience with thousands of recessed troffer problems comes this dynamic development - a complete new "packaged" line that is far more . . .

## S 4 4 3

- "Hand-Crafted" appearance with tailored trim
- Infinite design freedom any pattern based on 12" grid
- 20 sizes of popular standard and slimline lamps
- Wide range of diffusing and shielding media

- One basic unit for 31,360 troffer combinations
- Simplified ordering one number for a complete row
- Flange types on hand can be quickly converted to teebar—or vice versa

## USTALL A DISE

- Complete units ready to install no joiners
- Precision built on advanced-type machinery easy to align
- Patented end KO's assure accurate foot-lengths no trimming at end of rows



For full details call your nearest GUTH resident engineer or write for Bulletin 869-A.

IGHTING THE EDWIN F. GUTH COMPANY + ST. LOUIS 3, MISSOURI

Leaders in Lighting Since 1902

## SYNTRON

## **ELECTRIC** HAMMERS



## Save Money and Time



when You're Drilling-Cutting or Channeling in Concrete and Masonry.

General purpose Hammers that will save on most all types of work -drilling, chipping, cutting, sealings, etc.

Or-

Self-rotating Electric Hammer Drills for production hole drilling in concrete and masonry.

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Homer	City, Pa.
	Please send illustrated
fold	er on Electric Hammers to-
Name	
Street	
Zone	State



## Multi-Breaker

A new 2-pole "Ad-On" multibreaker to extend circuit arrangements on Type MO 9 "Ad-On" load centers has been announced. Load center can be extended to include up to a maximum of three double poles in combination with various single pole "Ad-On" circuits for lighting loads. It is a thermal-magnetic, common trip breaker having only one operating

Square D. Company, 6060 Rivard Street, Detroit 11, Mich.



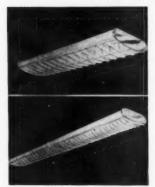
#### Incandescent Fixtures

A new type of recessed incandescent fixture has been announced. The Underwriters' Laboratories' label states that the minimum 4 feet of asbestos wire, as called for by paragraph 4179 of the National Electrical Code, is not required, thus permitting the rubber covered wire to be run directly to the fixture. The need for carpenter work is eliminated by mounting ears on the boxes and the use of bar-hangers which staple to the joists. An insulated junction box on

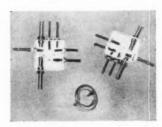
the side of the recessed fixture keeps the heat below 60°C limit for rubber covered wire.

The Kirlin Co., 3434 East Jefferson Ave., Detroit 7, Mich.

(20)



**FLUORESCENT** "Trimline Family" of 13 matching fixtures has been announced. The new commercial series permits flexibility, to suit all types and sizes of stores, schools and offices. Units are of different lengths and can be joined together to give the appearance of one long sweep of light. Available in two and four lamp fixtures. Manufactured by Sylvania Electric Products Inc., 500 Fifth Ave., New York, N. Y.



**Bushing Adapter** 

A new Heyco strain relief bushing adapter has been announced. It is a steel plate which fits into standard knock-out-box holes. It is designed to replace connectors and other fitting. Provides a clean-cut hole of the proper size to accommodate Underwriter's approved nylon strain relief bushings. Adapters can be inserted in the knock out box quickly. They are available with various size holes to hold any of the complete line of Heyco strain relief bushings designs to anchor such wires as POSJ, SV, SJ, and HPD. Reliefs are also made to fit S118 to S-14 wires.

Heyman Manufacturing Company, 100 Michigan Ave., Kenilworth, N. J.

# NOW for the first time...

LOW WATER ABSORPTION ... A HIGH-VOLTAGE INSULATION WITH ALL THE PROPERTIES NECESSARY FOR TROUBLE-FREE SERVICE UNDER ALL OPERATING CONDITIONS...

OZONE RESISTANCE

SIMPLEX - ANHYDREX XX NEOPRENE

RESISTANCE TO HEAT and AGING

## SIMPLEX-ANHYDREX XX

Here at last, in the new Anhydrex XX insulation, is the combination that assures dependable, low-cost cable performance under all conditions of high-voltage service. And in Anhydrex XX none of the effectiveness of one property has been sacrificed to gain the others.

Aged in an air oven for sixteen weeks at the grueling temperature of 250 F. (121 C.) Anhydrex XX remained rubber-like in quality and appearance, was still suitable for continued use. It retained approximately half of its tensile strength, nearly two-thirds its elongation. Most important of all, its rate of deterioration after the first few weeks was very slight, indicating exceptional stability and long life.

Ordinary oil base and heat-resistant compounds could not match this performance. Inside of only three weeks both had become brittle and, upon bending, immediately cracked and crumbled.

Aged at the same high temperature for seven days, Anhydrex XX was immersed for a week in distilled water at 158 F. (70 C.). It would not absorb more than 15 mg. per square inch of exposed surface. Bent around a mandrel, it was exposed to .03% ozone for four hours yet would not crack.

Anhydrex XX is the only insulation that provides this valuable combination. So that you may determine fully the effectiveness and stability of these properties even after years of service, we have drawn up an ironclad specification for Anhydrex XX which we will gladly send you upon request. Simply fill in and mail the coupon below.

## SIMPLEX WIRES & CABLES

SIMPLEX WIRE & CABLE CO. 79 Sidney St., Cambridge 39, Mass.

SIMPLEX WIRE & CABLE CO.	
79 SIDNEY ST., CAMBRIDGE 39, MASS	5.
GENTLEMEN: PLEASE SEND A COPY O	F SPECIFICATION 1685 TO:
NAME	TITLE
COMPANY.	
STREET	
CITY	STATE



## Dependable—Easy To Install

There are no excess screws, wires or complicated parts in "Latrobe" Floor Boxes and Wiring Specialities. Their design and mechanism is simple, sure and compact.

That is why "Latrobe" Products are so quick and easy to install—so efficient in service.



No. 252-R Two Gang Box with No. 206-207 Nozzle
The 2-gang adjustable Floor Box is shown with No. 208 Receptacle in one section. One Cover Plate has 1/8" Flush Brass Plug and one has 2" Flush Brass Plug.



No. 110 "Latrobe" Watertight Box

The neat compact design of the No. 110 Box quickens installation time and makes for smooth, trouble-free service. 208 Receptacle. Cover Plate is 3/5," diam.



No. 284 Nozzle with No. 200 Cover Plate

Here we have the neatest and most compact Duplex Receptacle Nozzle on the market. Shown with '2' Brass Pipe Extension. Can be furnished also with '3' pipe extension.



## "BULL DOG" BX CABLE STAPLES

Millions of these high quality staples are giving dependable service in all parts of the U. S. Packed in cartens, kees, or barrels.



Here is a brand new cable staple designed especially for use with Romex and all non-metallic covered cable. 11%" long by 9/16" wide.



No. 470 "Latrobe"

Pipe or Conduit Hanger Sturdy and dependable for hanging pipe or conduit  $V_2^{\prime\prime\prime}$ ,  $V_4^{\prime\prime\prime}$  and  $V_4^{\prime\prime\prime}$  to steel beams up to  $V_4^{\prime\prime\prime}$ thick. Large sizes for larger pipe.



#### Keystone Fish Wire

Made of high quality flat steel wire. Tempered exactly right. Ten sizes.

## FULLMAN MANUFACTURING CO.



#### Instrument

(22)

The high-voltage dc impulse transmitter with pickup coil and pointer indicating detector comprising this cable fault locator were designed primarily for locating fault on lead-covered cable installed in ducts. In operation the set is independent of the type of fault or its apparent resistance, and depends only on the impulse voltage required to break down the fault. Model 2-2 fault locator is rated up to 20 kv. with a discharge capacitance of 2.5 MUF, for use on all cable up to 15 kv. and higher. The set requires only about 500 watts to operate, from a 115 volt source of high voltage dc for proof testing on all types of electrical equipment.

James G. Biddle Co., 1316 Arch St., Philadelphia 7, Pa.



#### **Bulb Thermostat**

(23)

This bulb thermostat was primarily designed to control soil heating cables and electric heaters in greenhouses and hotbeds. Bulb may be imbedded in soil to control from actual soil temperatures or it may be exposed in air to control from air temperatures. The large capacity of switch and its small differential make it a moderate cost means of individual room control in electric house heating and for individual room heaters. A inch by 4 inch charged bulb connects by a 3 foot, tinned capillary tubing to a bellows which actuates a microswitch rated 15 amps., 115 or

230 volts. Switch and bellows mechanism together with a double plug-in receptacle and neon pilot bulb with a red bezel are housed in a 2 inch by 4 inch by 2 inch galvanized condulet box. Adjustable temperature range, 46° to 85° F. Differential 2°. Entire control depends upon the temperature to which the bulb alone is exposed.

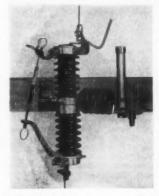
Gro-Quick Co., 340 W. Huron St., Chicago 10, Ill.

## Aluminum Wire

(24)

Production of polyethylene-covered aluminum wire has been announced. It is offered in a full size range of solid and stranded aluminum conductor as well as small sizes of ACSR. Advantages claimed are superior resistance to moisture, sunlight, weather hazards and abrasion and its smooth, clean, non-sticky finish. The new conductor is one-half the weight of PE-covered copper wire.

Kaiser Aluminum & Chemical Corp., Newark, Ohio.



#### Overload Protection

(25)

Lightning and or short circuit and overload protection on rural lines is provided with the Protectogap-Protectolink combinations. By grounding the expulsion gap assembly rather than the hanger, prevents birds or animals from shorting out the device. Expulsion gap has high impulse values and is ahead of the fuse link which reduces the number of fuse outages caused by lightning. They are available in 5 kv. 50 amp.; 7.5 kv. 50 amp. and 15 kv. 50 amp. Interrupting capacity of Protectogap assembly 8000 surge amperes, 1200 amperes, 60 cycle follow current. Can be supplied for mounting directly on transformers.

W. N. Matthews Corporation, 3850 Delor St., St. Louis 16, Mo.



# ACCURATE FRICTION AND RUBBER TAPES

MATERIALS — A major factor in the expanding demand for Accurate Tapes. Only finest grade cotton sheeting, purest live rubber are used in their manufacture. Result — permanent pliability, extra stretch, maximum cohesion — all important to clean, fast, economical taping.

WORKMANSHIP — Accurate Friction Tapes are super-calendered for complete impregnation of the base cloth. Careful slitting prevents tape from raveling when used. Accurate Rubber Tapes are specially compounded with unusual precautions taken to maintain caliper, elasticity and fusing characteristics.

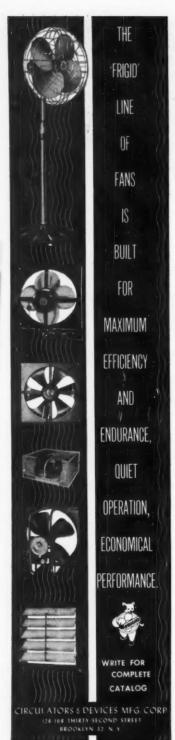
**QUALITY CONTROL**—Every production run must fully meet fourteen exacting quality control checks. These tests guarantee the quality of every roll shipped—are the big reasons why Accurate tapes have increased in popularity every year for over 30 years.



IF IT'S TAPE ... IT WILL PAY YOU TO MAKE SURE





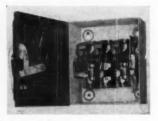




## Raceway (26)

Announcement has been made of the addition of 1900T Plugtrim, a new quarter round development designed for use with 1900 Plugmold. With a capacity for 5-pair twisted telephone wire, Plugtrim serves the dual purpose of a quarter round trim for Plugmold and a chanel for carrying low potential wiring such as is required for telephone and signal systems. Ease of installation is one of the outstanding features, made possible by the use of the 1903T clip which is designed so that it may be slipped behind the already installed Plugmold, or the scored section of

The Wiremold Company, Hartford 10, Conn.



## Safety Switch

A new Type A front operated safety switch has been announced. Added safety is secured by having the operating cross-bar of switch beneath the visible blades. To open the cover of switch, the front-operated handle normally must be turned to "cover open", requiring deliberate action by the operator to expose the switch mechanism. Switch handle can be locked with three padlocks in either "open" or "closed" position. Each blade on 250 volt switches has an arc muffler; switches over 250 volts have Noark Rolarc snuffers with two arcresisting rollers snapping together, extinguishing arcs. Switches have only two joints, one at the hinge and one at the breakjaw. Available in 30, 60, 100 ampere capacities for 230 volt ac: 250 volt, dc and 575 volt ac; 600 volt

Federal Electric Products Company, 50 Paris Street, Newark 5, N. J.

A griddle has been added to the Bilt-in electric range line. The roughin box which is designed to drop into the existing counter top is 231 inches long by 161 inches wide and 61 inches deep. The stainless steel frame is 25 inches long by 171 inches wide. The 174.6 square inch grid is 161 inches long by 103 inches wide. Recessed grease cup is easy to remove an clean. Flush handles on grid also simplify removal for quick cleaning. The range type, reciprocal switch has 5 heat positions of Hi, medium, lomedium, lo and simmer. Nickel chrome wire coils are ceramic insulated. Listed by Underwriter's Laboratories, the electric griddle operates on 2000 watts; 240 volts, ac.

Thermador Electrical Manufacturing Co., 5119 District Blvd.. Los Angeles 22, Calif.





WEATHERPROOF column light has been developed by Stone Manufacturing Company, Elizabeth, N. J. for use in gasoline stations, parking places, parkways, etc. Unit has a steel porcelain-enameled reflector, 20½ inches in diameter, with a deep overhanging skirt. Designed for normal base-up burning of 300 and 500 watt standard line lamps or for bipost lamps in 500, 750 and 1000 watt sizes.

## Projector (30)

The Transpro protector is a secondary-operated primary opening, for use with gas tubes in high-voltage circuits, to protect outdoor and indoor gas-tube signs, outline lighting and inside lighting. It protects signs against open-circuit or overload operation. It consists of Transpro receptacle and fuse. Receptacle is made of porcelain with suitable terminals to connect to the primary, and either one of the high-voltage terminals of mid-point grounded-secondary transformers. Fuse is non-renewable and screws into receptacle. Its primary is 7 amperes at 125 volts or less, with secondary ratings of 7500, 9000, 12,000 and 15,000 volts available.

Economy Fuse and Mfg. Co., 2717 Greenview Ave., Chicago 14, Ill.



## NO ASBESTOS WIRE NEEDED

Rubber-covered wire runs direct to fixture

## NO CARPENTER WORK

Applies to all KIRLIN incandescent models. All parts required for installation furnished with fixtures—AF pigtails; wire-nuts; junction box; heat insulated cover; support bars and staples; tape; everything needed to the R.C. building wire.



## **Recessed Fixtures**

are made in all sizes—
square or rectangular—
and in fluorescent

- Alzak GlasSurfaced Aluminum Reflectors
- Spread-type or Concentrating Lens
- Hinged Rust-resisting Doors in Diecast Frames
- Individually packed for shipping
- U.L. and IBEW LABELS
- NOTHING HANGING FROM CEILING

In steck of leading wholesalers everywhere The IRLIN CO.
3435 E. Jefferson Avenue
Detroit 7, Michigan





Illinois dry process wireholder insulators are uniformly made to meet exact specifications in sufficient styles and sizes for all requirements. Smooth, rounded surfaces protect wire insulation—deep, sharp screw threads assure easy and firm installation. Non-shrinking metal alloy binds screws permanently to insulators. Steel screws are evenly coated by special galvanizing process to prevent rust streaks on sides of buildings. Wet process porcelain supplied for primary circuits.

- · HIGH MECHANICAL STRENGTH
- HIGH DIELECTRIC STRENGTH
- EXACT DIMENSIONS AND UNIFORMITY



MACOMB,



#### Trailer

(31)

A new carry-all Trailette has been announced, which is a hitch-all, two wheel, all-purpose "take-it-or-leaveit" Trailette that hitches to any light truck or passenger car. It hitches to all standard bumpers and is equipped with an all-car hitch, support jack wheels, tires, tubes, lights, semielliptical springs and torque-less axle. A number of trailettes can be hitched to one truck and left anywhere as long as needed. In addition to its weatherproof compartments with double positive-sealed rubber weathertight door openings, have winterproofed cylinder positive-action type locks. Available in two models, one 915 inches long, the other 75 inches

Morrison Steel Products, Inc., Buffalo, N. Y.

## Threading Machine

(32)

Four portable 2 inch threading ma-chines comprise the "Tom Thumb" line recently announced. Two models, Nos. 582 and 582-R, are designed primarily for threading pipe from inch to 2 inch standard range; extra range inch pipe, extended range with drive shaft 21 inch to 8 inch. Both models have a bolt range of ½ inch to 1½ inch. Two other models, Nos. 581-A and 582-A, are for threading bolts from 1 inch to 11 inch. No. 581-A has a pipe range of & inch to 14 in. Pipe range of No. 582-A is 4 inch to 2 inch. No. 582 is for threading straight pipe or conduit and bolts. No. 582-R for threading bent as well as straight pipe, conduit and bolts. Each bolt machine is equipped with automatic revolving die-head and open-type vise for threading bent and straight bolts, rods, pipe, studs, etc. Oster Manufacturing Company, 2034 E. 61st St., Cleveland 3, Ohio.

## Electromatic Steam Boiler (33)

A new, stationary, automatic electric steam boiler has been announced. It is made in accordance with A.S. M.E. specifications for working pres-

sures up to 150 pounds and will stand a 300 pound cold water test. Available in 40, 60 and 90 gallon sizes. Boiler hp. depends upon number of elements ordered. Each element of 10 kw. develops one boiler hp. Boilers are furnished in sizes as small as 1/10 hp. up to a maximum of 10 hp. It is recommended for producing either small or moderate amounts of steam up to full 90 pounds pressure. Can be used as a steam cleaner and will handle two cleaning nozzles.

Siebring Manufacturing Company, George, Iowa.

#### **Electric Plants**

(34)

Two new electric plants have been announced. Engineered for portable electric power, the 350 watt plant, equipped with carrying handles, weighs 70 pounds. The 750 watt, 115 volt, ac model will operate 30, 25-watt lights at one time, household appliances, and various kinds of power tools with motors not exceeding ½ hp. The automatic model starts when any light, appliance or motor is turned on and stops when all loads are turned off.

Kohler Co., Kohler, Wis.



## Photoelectric Relays

(35)

A new standard line of accessories for photoelectric relays consisting of a complete range of improved light sources and phototube holders has been announced. The newly designed general purpose light sources have 'snap-on" covers that make possible lamp replacement in about 20 seconds. Phototube holder is furnished with phototube lens, masks, and nine feet of connecting cable. For mounting convenience both a mounting lamp (providing 360° horizontal and 120° vertical adjustment) and a standard pipe thread for half-inch conduit are provided.

General Electric Company, Schenectady 5, N. Y.



The formula for Good Lighting is the combination of proper equipment and simple methods of maintenance. The Abolite Duo-Move System encourages regular cleaning habits because Duo-Move units can be cleaned and relamped quickly and safely without using clumsy ladders. Merely a twist of the wrist—reflector and lamp assembly can be removed and serviced—another turn and it's back in position ... no interruption to workers ... no lost time. The Abolite Duo-Move System guarantees maximum illumination with minimum service expense. Write for the Duo-Move story today!

THE JONES METAL PRODUCTS CO., West Lafayette, O.





## 1 MAN CAN DO THE WORK OF A CREW...

**Use Electric Tools** 

on Every Job!

Speed the work, cut costs on installation and maintenance jobs. Lightweight Onan air-cooled electric plants supply electric power anywhere for lights, drills, saws, hammers, spades and other motor-driven tools. Equipped with carrying handles of dolly-mounted. Take 'em anywhere and plug in for all the power you need.

SHIPPED COMPLETE READY TO RUN

A. C.: 350 to 35,000 waths.
D. C.: 750 to 15,000 waths.
Diesel plants: 2,500 to
55,000 wats.



D. W. ONAN & SONS INC. 3177 ROYALSTON AVENUE Minneopolis 5, Minnesoto



Established 1911



Tool

A new tool for solderless electrical connections has been announced. Known as C22 "pre-Sure Tool", it provides for all usually required splices and terminations, being capable of splicing all wire combinations from two No. 18 to three No. 8 and terminating all wire sizes from No. 16 to No. 8. It incorporates positive 4-way crimping action which is effective on solid, stranded, or combinations of solid and stranded wires. New tool installs all of manufacturer's solderless "Termend" lugs and 2004 and 2011 solderless splice caps.

Buchanan Electrical Products Corp., 1290 Central Ave., Hillside, N. J.

#### Power Plants (37)

Power plants in sizes from 350 to 2000 watts, both ac and dc are available. The new plant has 4 cycle, single cylinder L-head type engine, is air cooled by a fly wheel blower and has oil bath type air cleaner. Automatic reverse current cutout prevents discharging of battery through unit when generator voltage falls below battery voltage, or when unit is stopped. It is recommended for use in many rural areas; on farms, ranches, and in schools, oil fields, mines, greenhouses, service stations and locker plants. It is also for portable use in mobile tool shops and mobile PA systems.

Cyclohm Motor Corporation, 5-17-46th Rd., Long Island City 1, N. Y.

#### Thermal Control (38)

Sentry TC type fluorescent starters have been designed to overcome the disadvantages inherent in glow switch type starters. All operations are performed by bimetals, resistor and auxiliary circuits in air. Proper uninterrupted filament preheating starts the tube in one cycle, resulting in longer lamp life. Sentry TC starters will start fluorescent lamps over a wide voltage and temperature range, automatically cut-out a deactive or defective lamp and automatically rest itself when the power circuit is removed.

Industrial Starter Corp., 6 Pell St., New York 3, N. Y.

### Mercury Lamp

(36)

(39)

A thorium non-activated cathode makes possible a mercury lamp with the same rated life at five hours per start as was previously realized on a less-demanding burning schedule of 10 hours per start. This new construction feature is now provided on all Westinghouse quartz-type and high intensity photochemical mercury lamps. Average life values are 250 watt C-H5 4000 hours; 400 watt E-H1 4,000 hours; 1000 watt A-H12 3000 hours; 3000 watt B-H9 4500 hours.

Westinghouse Lamp Division, Bloomfield, N. J.

## **Product Briefs**

Korfund Company, Island City, N. Y. has announced a new vibration isolator for mounting pumps, compressors, fans, and other equipment where isolation is desired. . (41) Lumidor Manufacturing Co., Los Angeles 58, Calif. has developed a new bulb changer which uses rubber holder with vacuum created by built-in vacuum pump operating with single

(42) A new control device which responds to a flow of cold water to open or close an electrical contact has been announced by General Electric Co., Schenectady, N. Y.

(43) Mathias Klein & Sons, Chicago, has announced the addition of adjustable climbers to its line of tools and equipment for electricians and linemen. . . (44) Automatic Control Company. St. Paul, Minn. has introduced a new control, called Protectrol, which automatically stops the pump and keeps it from starting until manually reset. . . (45) Micro Switch, Freeport, Ill., has announced a new small door interlock switch assembly for automatically cutting off the power circuit when a high frequency cabinet door is opened.

(46) General Electric Co., Schenectady, N. Y. has announced a new expansible-type of traffic controller. . . . (47) Neco Manufacturing Company, Auburn, Ind., has introduced a display sign that has interchangeable neon letters, which plug into sockets which are mounted on a double tiled and single tiered platform. . . . (48) A new cyclo-twist carbide-tipped rotary drill bit is being manufactured by the New England Carbide Tool Co., Cambridge,

# Call your CENTRAL CONDUIT DISTRIBUTOR when you want...



# DEPENDABILITY



Dependability is the watchword of your Central Conduit Distributor. He maintains a smooth functioning team to provide you with top-notch service. And he makes sure that the products he has for sale are equally dependable. That's why he handles and recommends Central Rigid Steel Conduit. He knows that every length measures up to the rigid standards that have made the name Spang famous for quality.

Central Rigid Steel Conduit is made in three types ... Cenlaco, Central White and Central Black. All of them are approved by the Underwriters' Laboratories, Inc. Next time you need Conduit or other electrical supplies, call your Central Conduit Distributor. That's the way to be sure of the best in products and the best in service.

## SPANG-CHALFANT

Division of The National Supply Company

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CENLACO a hot dipped galvenized and lacquered finish, inside and out.



ENTRAL WHITE electro-galvanized outside and black enameled inside.



CENTRAL BLACK permanent, baked-on black enamel finish, inside and out.





New Kennametal "twist-type" masonry drill keeps drilling with no "time-out" for hole cleaning. Spiral flutes clean cuttings back as fast as they form. Drill operates easier, requires less power and

Super-tough Kennametal cemented carbide cutting edge resists wear, stays sharp — UP TO 100 TIMES AS LONG.

Buy Kennametal drills at your supply house.

## If your supply house cannot supply you, write:

KENNAMETAL	Inc., Latrobe, Pa.
K-109 showing 2	FREE Kennametal Folder 6 different drill sizes, two yles, and complete details ing.
Name	
Address	
City	State

Gets Money-Saving

RESULTS

To holes, 12 inches deep in seconds per hole, 12 inches deep in seconds per hole, 3127 deep in cheep in consent between respect hole, 13 seconds saved 712 hours in one day with one deill. Saved money had caster going.

brick, slate, marble

New trouble-free drill works

in any direction, goes to any depth up to 10 inches,

drills faster... can save on time and cost.



Be set for any job with handy unit of assorted drill sizes. Kit holds ½", 5/16", ½" and 9/16". Tough plastic case resists water and oil.



Convenient carton of six drills of one size keeps a sharp drill always handy. Drills lift as top opens.

## KENNAMETAL

WORLD'S LARGEST MANUFACTURER OF

- (49) Dunbar Glass Corporation, Dunbar, W. Va., has developed a complete consumer line of replacement glassware for lighting fixtures and portable lamps. . . . (50) An instrument which records and automatically controls humidity has been announced by the Weston Electrical Instrument Corp., N. J. . . . (51) Heat and corrosion resistant copper wires for aircraft industrial and laboratory equipment is being produced by Sylvania Electric Products Inc., Warren, Pa.
- (52) F D Kees Manufacturing Company, Beatrice, Neb., has announced new socket meter cover for all standard "S" type meters. . . (53) Fedders-Ouigan Corporation, Buffalo N. Y. has begun production of two new type room air conditioners. . . (54) Chelsea Fan & Blower Co., Inc., Irvington, N. J. has announced new 16 inch and 22 inch reversible two-speed window fan, Type WPR spin-it fans.
- (55) A new line of one-way cut-off register controls has been announced by General Electric Co., Schenectady, N. Y. . . . (56) Eltron, Inc. of Jackson, Mich, has announced a new miniature high voltage power supply for use in military and civilian Geiger counter equipment. . . (57) A new sensitive relay, called Model SW, in either an open or hermetically sealed model has been announced by Allied Control Company, Inc., New York, N. Y.
- (58) Kennametal Inc., Latrobe, Pa. is now producing a line of Tri-Point rock drills for drilling granite, sandstone, hard limestone, concrete, etc. . . . (59) Bisonite Company, Buffalo, N. Y. has announced a new aluminum coating for brushing, spraying or dipping and air dries to handle in 12 to 18 minutes. . . . (60) Superior Carbon Products, Inc., Cleveland, Ohio has announced a new service whereby burned or worn copper contacts can be renewed by brazing on faces of silver or silver allow.
- (61) New type CSP life-line motors especially designed for applications where corrosive fumes and liquids are encountered, are available from Westinghouse Electric Corp., Pittsburgh, Pa. . . . (62) Electro Chemical Supply & Engineering Co., Emmaus, Pa. has announced a new kind of electrical control designed as a safety device for protecting water-cooled, electrically-operated equipment, such as air compressors, vacuum pumps, etc.
- (63) The United States Craphite Company, Saginaw, Mich. has announced the development of Statite, a new permanent shunt connection for carbon brushes. . . . (64) A new 90-watt fluorescent lamp has been announced by Westinghouse Lamp Division, Bloomfield, N. J. . . . (65) Baldor Electric Company, St. Louis, Mo. has announced a new line of exhaust fans, 16, 20 and 24 inch sizes.

# CATALOGS and BULLETINS

- (66) PLANNED LIGHTING GUIDE covers subject from management viewpoint, breaking problem into economics, equipment selection and program development. Benjamin Electric Mfg. Co.
- (67) SLIMLINE and fluorescent fixtures produced since 1942 are included in complete sectionalized catalog. Ruby-Philite Corp.
- (68) ELECTRIC WALL HEATERS for fast warmth in bathrooms, nurseries and bedrooms are subject of pocket-sized folder, Frank Adam Electric Co.
- (69) BLOWERS and fans for wide variety of requirements in industrial, residential and commercial locations are pictured and specified in catalog. Chelsea Fan and Blower Co., Inc.
- (70) SWITCHBOARDS of standardized design for economy or custom-built for specific requirements are pictured and discussed in bulletin 18B6149A. Allis-Chalmers.
- (71) PORTABLE POWER TOOLS such as hammers, drills, grinders, polishers, vibrating floats and spike drivers are discussed in 30-page pocket-sized booklet. Syntron Co.
- (72) SELENIUM POWER RECTIFIERS are subject of 16-page file catalog illustrating and describing equipment in terms of application, life, types available, regulation, efficiency and circuits employed. Accurate Engineering Co.
- (73) Panalarms for hazardous and corrosive atmospheres, with hermetically sealed relay units, are pictured and specified in 4-page file folder. Panalarm Products, Inc.
- (74) ELECTRIC STAIRWAYS are extensively presented in 48-page booklet B-4403 discussing the Who, What and How of Electric Stairways. Westinghouse Electric Corp.
- (75) Large Motors for oil pumping service, with suggestions for proper selection, are described in 24-page issue of the E-M Synchronizer. Electric Machinery Mfg. Co.
- (76) EXHAUST fans for business, industrial and institutional buildings are described in 16-page 2-color buildin X6559. Emerson Electric Mfg. Co.



Money Saved with ROCK Drills

Francis M. Neighly reports:
"On foundations, granite
slabs, and hard marbe floors,
slabs, and hard marbe floors,
drills have saved me days of
hard drilling and plenty on
hard drilling and plenty on
hard drilling and plenty on
hard slab of bard concrete
30 holes through a 5 inch
slab of bard concrete in less
than one hour."

Use to: Anchor Machinery Install Conduits • Cut Stone • Install Parking Meters Fasten Signs, Doors.

Sets of one size in handy box of "pullout" construction.



KENNAMETAL

WORLD'S LARGEST MANUFACTURER OF CEMENTED CARBIDE DRILLING TOOLS New Kennametal Tri-Point ROCK drill hammers through the most abrasive sandstone, concrete aggregate, and HARD ROCK. Brute Strength enables it to take terrific poundings, shocks and impact.

Its wear-resistant Kennametal cutting edge stays sharp up to 100 times as long—gives up to 30% faster drilling speed. Diameters are 3/4" to 1"; lengths, 73/4" and 12". Buy money-saving Kennametal Tri-Point ROCK Drills at your supply house.

If your supply house cannot supply you, write:

KENNAMETAL Inc., Latrobe, Pa.

Please send me FREE Kennametal Folder K-111 showing how ROCK drilling is done at a saving of time and money and also complete particulars on the Kennametal Tri-Point ROCK drill.

Name Address

ity ...... State



- (77) Splicing Kits and cable devices are subjects covered in bulletins 50 and J50, G & W Electric Specialty Co.
- (78) LIGHTING MODULES, using 14-, 40- and 75-watt T-12 as well as 32watt Circline fluorescent lamps, are sketched, specified and described in 3-color catalog 360. Mitchell Mfg. Co.
- (79) Window Coolers for many applications are specified in 4-page file folder. Edgar T. Ward Industries, Inc.
- (80) INFRA RED oven for baking, refinishing, bonding and experimentation is described and priced in Form 72-648-150.15M. Fostoria Pressed Steel Corp.
- (81) DISTRIBUTION TRANSFORMER, with mechanical data, load-time curves and five type designations, available in ratings from 3 to 100-kva.. are included in bulletin 61B7309A. Allis-Chalmers.
- (82) LIGHTING for theatrical, architectural and television applications, including photographs, data and discussion on installation details, lighting equipment, controls, wiring devices, wire and cable, optical accessories, dimmers, special lenses and reflectors, is subject of 3 booklets jointly covering over 100 pages. Century Lighting, Inc.
- (83) POWER PLANT EQUIPMENT for controlling draft is included in 36-page bulletin 3750. Buffalo Forge Co.
- (84) HAND HOISTS are discussed with action photographs, specifications, cross-section drawings and application illustrations in 6-page folder DH-164. Wright Hoist Division, American Chain and Cable Co., Inc.
- (85) OIL CIRCUIT BREAKERS of moderate capacity for outdoor distribution service is subject of bulletin 71B609-3C. Allis-Chalmers.
- (86) Antennaplex brochure describes television system for hotels, apartment houses, institutions and department stores. RCA Victor division of Radio Corp. of America.
- (87) Air Circulator catalog X6558 includes suggestions for selecting and installing equipment, with performance installation, distribution curves, technical data and accessories. Emerson Electric Mfg. Co.
- (88) Time Switches, single and double pole, double throw, low voltage and poultry dimmer provisions are specified and priced in Form TS-7. International Register Co.

- (89) SELECTOR SWITCH control with description, applications and detailed installation illustrations. Arrow-Hart & Hegeman Electric Co.
- (90) FORM-BAR BENDER for making twists, offsets and variety of bends in copper, aluminum, iron and steel up to 1-by-9-inches. Winfield R. Scott.
- (91) LIFE-LINE CHEMICAL MOTORS for operation in atmospheres where corrosive fumes and liquids are encountered are described with construction sketches and test data. Westinghouse Electric Corp.
- (92) FLUORESCENT lighting for commercial, industrial and institution applications, including open, louvered and lensed units, mounting brackets and accessories, is subject of AIA File 31F2, Ender Mig. Corp.
- (93) ALUMINUM COATING for fast drying, heat resisting, permanent high brilliancy uses is discussed in 1-page file sheet. Bisonite Co., Inc.
- (94) ORNAMENTAL LIGHTING fixtures in cast iron, bronze and aluminum for exterior and interior applications is discussed in catalog 50. The Herwig Co.
- (95) PIPE AND BOLT machines are discussed by users of these units. Beaver Pipe Tools.
- (96) Fans for farm, residential and commercial applications where comfort cooling is the objective are included in reference folder. Air-Equipment Co.
- (97) Connectors and solderless lugs for all purposes, with complete specifications, prices and application suggestions are contained in catalog 5LC. Krueger & Hudepohl.
- (98) SMALL MOTOR CATALOG, SVNchronous, reversible and unidirectional for industrial instruments, advertising devices, domestic appliances and projection equipment. Barbar-Colman Co.
- (99) Motors and Generators are pictured and specified in bulletin 15-1. Janette Mfg. Co.
- (100) Home Cooling manual covers cooling and ventilating problems, equipment design and construction, specifications and illustrations, Hunter Fan and Ventilating Co.
- (101) POWER CIRCUIT TRANSFORMER. dry type, from 50 to 15000-va capacities, is discussed in 4-page pocket-sized folder. Jefferson Electric Co.



## READY FOR WORK

Service-Master requires no assembly or com-partment accessories before it's ready to use. Once you've seen Service-Master you'll know why it gives you more for your money . . . in

appearance, completeness, and quality of construction. CHECK YOUR OPERATION. See how the ent Service-Master can step up your out-Time costs Money . . . Do it Now!

Take the first step toward lowering your service costs MAIL THE COUPON BELOW FOR FULL DETAILS!





## RoMarine - RoPrene and RoZone - RoPrene

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# Reader's Quiz

## Control

UESTION 345-We received a call that they were having trouble with a slip ring motor at certain steps on secondary controller below full speed. At full speed the needle on the ammeter on primary side would stand quite still, but when it was stepped down to a lower speed there would be quite a fluctuation, and when brought to full speed it would disappear.

Our man reports there is no ground, no broken grids and have found no loose connections, though we at first thought this was the trouble. What is the reason for this connection?-

C.I.O.

TO QUESTION 345-The · question does not indicate that the controller was checked for each step of resistance, a similar experience showed that the contacts of controller were at fault.

Usually the inside cover of controller has a wiring diagram showing connections for each step of resistance. since your report indicates no grounds, no broken grids, no loose connections and no trouble at full speed, the controller must therefore be at fault. -T.R.

TO QUESTION 345-As • there is no ground, broken grids or loose connections in the secondary circuit and floating ground on rotor or faulty contact of slip-rings is out (because of steady reading at full speed), it seems to point to pitted contact fingers and controller rings due to arcing. A poor contact or a loose joint in a circuit is an added resistance which decreases the line current in proportion to its increase. But, in this case, the contact seems erratic which could be due to the uneven pitted surface of the contact rings which would offer a varying resistive circuit, causing the fluctuations. The method employed for quenching the arc (in this make or type of controller) is at fault and should be remedied, as the slip-ring motor (unlike the squirrel-cage motor with its high resistance short-circuiting end bars) is

not designed for "across-the-line" starting. If the fingers gave poor contact up through the stages of resistance and gave good contact at the high speed (or short-circuiting ring, which is generally free of pits), an "acrossthe-line" condition could exist before the rotor had accelerated and built up sufficient counter E.M.F. to prevent a surge of line current.-I.V.H.

TO QUESTION 345-This A condition is inherent in slip ring motors and is known as the slip

cycle,

The magnetic field of the stator rotates constantly at synchronous speed, regardless of the speed of the rotor. At full speed, the rotor is at or near synchronous speed and the slip is at a minimum. At this stage there is a steady interchange of magnetic flux between the stator and rotor, and therefore there is a steady primary

At speeds below synchronous, the slip has increased to quite an extent. At this stage, there is a fluctuating interchange of magnetic flux between stator and rotor caused by the rotating magnetic field of the stator slipping past the induced poles of the rotor. This in turn creates a fluctuating primary current.-S.S.P.

TO QUESTION 345-On a slip ring motor I traced this trouble to brushes which had about it inch of brush between a new brush and a brush which could not reach the rings. By redesigning the brushes to get about & of an inch instead of the is inch, I eliminated the trouble. An ammeter reading of each secondary lead would indicate an open which is sensitive to a certain speed.-H.S.

TO QUESTION 345-Check A all contacts on "live" controller, in the dark, and "spot" any abnormal arcing in all positions, because variable speed motors are very

Also, the slip rings on motor have to be practically perfect. If steel, they are too hard for abrasives, put it in a lathe. Check face of brushes for hard spot, see if they are wearing smooth

Watch the grids in pitch darkness

for the least bit of arcing under load in all positions. Watch from several positions; if you see even one little spark on these, locate and repair it.

On one job where the operation of machine was about like yours, it proved to be an intermittent ground in the armature. An instrument would only detect it perhaps once out of 5 times. A rewound armature corrected all the trouble.-M.C.T.

## Water Pump Motor

UESTION 346-I have a problem concerning a 2 hp. Delco motor connected to a water pump that constantly burns out the connecting wires on the starting brushes. The motor has a conventional disconnect switch with two 30 amp. fuses, a motor control with rated heater coils and is wired automatically on a pressure switch. I have used No. 10 BX cable and wired it for 200 volts ac current from main panelboard. We do not have any voltage drop. The motor starts without any apparent overload and operates perfectly normal as long as it is attended. However, it cannot be left alone for more than 18 hours, for then it burns out the connecting wire on the starting brushes. I replace the brushes or make a temporary connection across the brushes and it starts without any trouble. It never blows out fuses or throws out the motor control. Can you explain or suggest a remedy? .- G.M.D.

TO QUESTION 346-The 2 · hp. single phase repulsion-induction water pump motor has evidently an improperly operating short circuiting device which is causing the brush shunts to burn. Since this trouble does not occur on every start, it is apparently of a mechanical nature caused either by gum and dirt or badly burned and pitted short circuiting bracelet and commutator bars at point of contact of the bracelet.

This Delco motor is probably of the brush riding type with the short circuiting device at the end of the com-

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mutator. In this case, the segments of the bracelet can easily be inspected for cleanliness and freedom of action. With the line switch off, this mechanism can be quickly cleaned with a noninflammable cleaner and a bristle brush and blown out with compressed air. Particular attention should be given the inside portion of the commutator where the bracelet segments make contact. Dirt may be packed in this location preventing the segments from making proper contact when thrown out by centrifugal action. Also, gum between bracelet segments may be slowing down or preventing proper

After cleaning has been accomplished, (which of course, could have

been more easily done by removing the end bell), the bracelet should be inspected for burning. The point of a knife or other sharp instrument should be inserted between every bracelet segment to determine whether any portion of the bracelet is welded together, also the garter spring should be slipped around to be sure that it is not burned or stuck to the bracelet. Roughened tips of the bracelet can be smoothed with a file. If the inside of the commutator bars are badly burned, it may be necessary to dismantle the machine and take a light cut with a lathe to restore this portion of the contacting surfaces.

A prolonged starting period, or failure of the short circuiting device to operate, means that the motor is operating repulsion and the brush arms and shunts are carrying the armature current and since the shunts are made only large enough to carry this current for only a few seconds, continued operation for a few minutes will be suffi-

cient to burn them. Since mechanical failures may not show up on every start on automatically controlled motors, it is well to make clean-up programs more often on single-phase motors because of their many mechanical parts, and thus prevent the one failure that might burn the motor up when it is unattended.

TO QUESTION 346-The · motor in question is undoubtedly a repulsion-induction type motor. This type motor starts as a repulsion motor and after it has come up to speed a centrifugal switch shorts out the commutator segments, and it runs as a straight induction motor. The trouble in this case is probably that the centrifugal switch does not short out the commutator segments and current flows continuously through the brushes and connecting wire as long as the motor is running. This current is in the secondary circuit and is of rela-



Core and coil assembly of a Sorgel 1500 kva., 5 phase, 12,500 volt air-cooled transformer ready for mounting in the steel enclosure of a unit sub-station. Coils are disc type, separated and supported by steatite spacers. It is built to operate at temperatures up to 80°C. above normal ambient. Natvar Varnished Fiberglas and Varnished Fiberglas Sleeving are used to insulate coils and leads. Natvar Varnished Fiberglas Tape is used for extra end turn insulation.

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tively low voltage. Consequently, it does not add appreciably to the line current and therefore does not actuate the overcurrent devices. The brushes and jumper are not designed to carry current continuously, but only on starting.—R.S.F.

A TO QUESTION 346—The nature of the job and the type of motor described is probably responsible for burning the brush shunts.

A Delco repulsion-induction motor in larger sizes on a heavy and light cycle load such as a pump develops short-circuiting trouble that burns the brush shunts or pits the armature shaft journals which caused excessive bearing wear.

If in starting the short-circuiting weights fly out to make contact with the commutator at the period when the load cycle is approaching its height, the armature slightly slows down, reducing centrifugal force on the weights, which causes them to make slow contact with the commutator and results in pitting. A severely pitted condition prevents proper short-circuiting and heavy armature current travels through the brushes and shunts, burning the shunts. Also heavy current flows through the winding, grounded short-circuiting assembly, armature shaft, through the oil film to the bearings, through the motor frame to the brushes, commutator and winding again. In leaving the shaft, the current pits the journals, causing a condition in appearance resembling "small pox scars" which results in excessive bearing wear.

A temporary remedy is to polish the short-circuiting weights and the under side of the commutator extension where contact is made with the short-circuiting weights. Frequency of this operation depends on severity of pitting, which is determined by frequency of starting period and the nature of the load.

The best remedy if possible is to replace the single phase motor with a 3-phase motor, thus eliminating starting troubles inherent to single phase motors.—J.A.

TO QUESTION 346—There may be two causes for the trouble in your Delco motor. First the brush shunts may be too light for the amount of current they have to carry and then too, the short-circuiting device may not be making good contact with the commutator bars and therefore the brush shunts carry part of the running current.

Most brush manufacturers and also the motor manufacturers do not appreciate the amount of current carried by the brush shunts at the time of starting and therefore use too light a shunt for their brush connections.

You should first make sure that the short-circuiting segments are making good contact with commutator bars and if this does not remedy the trouble, have some brush manufacturer make you a special set of brushes of precipitated copper with a shunt two and a half, or three times the size wire ordinarily used.—M.H.S.

TO QUESTION 346—The pressure storage tank on the mentioned water pump must be water-logged. In other words, all the air has leaked out of the pressure storage tank changing the system from pneumatic to hydraulic, causing the motor and pump to start and stop every few seconds, putting extra load on the motor brushes.

The remedy would be to get air back in the tank and the motor will then have longer running and idle periods.

—L.D.P.

#### **Transformers**

UESTION 347-In a 3 phase circuit, can a closed delta transformer bank be successfully operated in parallel with an open delta bank? Both banks are made up of single phase transformers, all five transformers alike in rating, ratio, and impedance. The two banks are located cuite a distance apart, and both the primary and secondary lines connecting them of comparatively high impedance. The load is fairly uniform along the entire length of the line between the two banks .- W.B.S.

TO QUESTION 347—Under no circumstances should a closed delta bank be operated in parallel with an open delta bank. Otherwise, it will be found that the third transformer in the closed delta bank will overheat and burn out.

When operating open delta, there are small but significant voltage differences that must be considered due to the phase shift within the transformer. There will be definite unbalance between the closed and the open banks, which will cause considerable circulating current between the banks. And the third transformer will attempt to balance the load all by itself.

If the banks are not loaded to full capacity, then it will be possible to allow the third transformer to carry some load; but a safer method of



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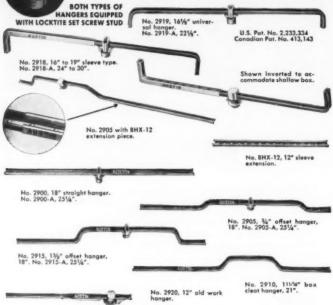
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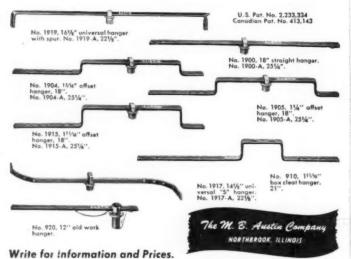


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operation would be to use both banks as open delta.-H.H.S.

TO QUESTION 347—Open delta connection is only used in emergency and as a temporary expedient until conditions warrant to complete the closed delta connection.

Further, W.B.S. must bear in mind that the capacity of an open delta transformer bank is reduced to approximately 58% of the closed delta capacity rating.

On account of the unsymmetrical connection, current division and different phase displacement between primary and secondary, it is not adviseable to parallel these two transformer banks.—C.B.

TO QUESTION 347—There is no good reason why an open delta bank cannot be operated successfully in parallel with a closed delta bank insofar as the electrical angles are concerned. However, considerable care must be used in operating such a system which is known as an "inter-connected system". Sectionalizing fuses must be properly placed so that if the fuses of one bank should blow, the entire load will not be placed on the other bank, which would then cause its fuses to let go, thus dropping the whole load.—W.B.M.

TO QUESTION 347—The two transformer banks, with the characteristics described would operate successfully in parallel. However, there are two fundamental disadvantages in such a connection.

First. The overall capacity of the transformer banks would be reduced. At present, the closed delta bank can operate at full nameplate rating and the open delta bank at 86.6% of combined nameplate ratings. The latter rating is due to each transformer having to carry the total line current. If the two banks are connected in parallel, the output capacity is only 80% of the combined nameplate ratings. At this point, with balanced load, the transformer which is connected alone across the delta becomes fully loaded. To be concrete, let it be assumed that each transformer has a rating of 100 kva. The closed delta bank could carry 300 kva. and the open delta 173 kva. This gives a combined rating of 473 kva. before interconnection. After interconnection, the combined rating would be only 400 kya.

Second. Unless there is some means of sectionalizing the secondary circuit, an operating difficulty presents itself. Suppose an overload causes one set of primary fuses to blow. The other set would soon follow. The connected load would have to be reduced below the operating limits of one bank, and kept there, until fuses were replaced in both banks. Otherwise, fuses would blow as fast as they were installed. Or, if heavy fusing or fuses with some time lag were used, the maintenance man could spend the rest of the day running back and forth between the two transformer banks.—L.E.B.

#### Can you ANSWER these QUESTIONS

QUESTION P16—What is necessary in order to convert a compound wound 220 volt 1800 rpm. motor over to a dc generator, 220 volt output preferred?—L.C.S.

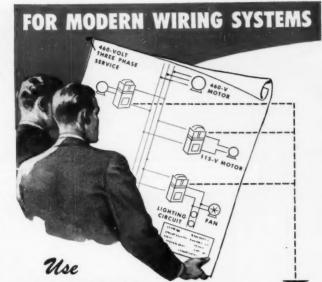
QUESTION Q16-Most 3 phase motors will blow one of the fuses when applied on a single phase line of the proper operating voltage. Now, the question is, what type of winding is used in a 3450 rpm. saw motor which was continued in use, starting and stopping without the operator's knowledge that one of the phases was out due to a blown fuse? The motor is a 220 volt 3 phase started by a magnetic push-button type switch fed by a fused safety switch. Attention was drawn to the blown fuse by the fact that the motor did not come up to running speed in proper time .-E.S.H.

QUESTION R16—In busbar work I have used the figure of about 1,000 amperes per square inch in calculating the size of busbar to use in my wiring. The question I have is, by approximating what amount do I reduce this figure as I use two busbars (6" width, 4 thick) in parallel, and by how much if I use three bars in parallel? The spacings between bars being 4 inch.—E.I.K.

**QUESTION \$16** — What precautions should I take when I am asked to repair an item that may be radioactive?—H.S.

QUESTION T16—I understand that most bell or signalling transformers are made so that a short on the low voltage side will not burn out the transformer. Is this done by using small wire on the primary or secondary or by changing the arrangement of the wiring or iron?—C.S.

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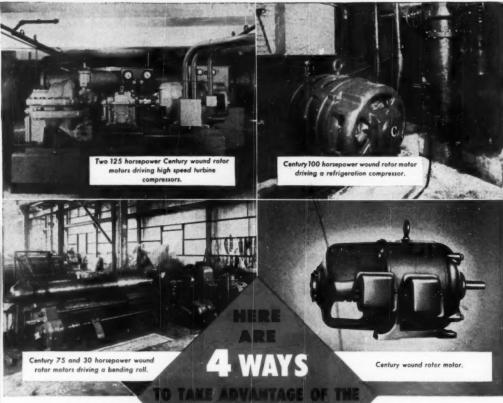
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### **Questions on the Code**

#### No. 12 Wire Circuits For House Wiring

I recently figured on a set of plans where the architect specified a circuit to the bathroom, porch, living room, kitchen and bedroom, all lines to be No. 12 wire and then set a panel of ten circuits with circuit breakers set at 20 amperes; and then run hall lights, closets etc., tapped in at nearest point of these lines.

I maintain that the No. 12 wires are O.K. and panel with circuit breakers at 20 amperes are O.K. but that lights should be on panel set at 15 amperes.

Am I right in my argument?

-E.O.R.

Branch circuits of No. 12 pro-A. tected with fuses or circuit breakers at 20 ampere rating or setting may be used in a dwelling provided the following conditions are

If Lampholders on such circuits are of the heavy duty type or of the unswitched porcelain type (2123a and

If receptacles are of the 20 ampere rating or of 15 ampere rating, if used for the connection of fixed lighting units (2123b and c3);

If used to supply only small appliances and lighting units having heavy duty lampholders.

Unless these conditions are met, the branch lighting circuits should be protected at 15 amperes .- F.N.M.S.

#### **Lighting For Paint** Spray Room

Why does our inspector refuse Q. Why ages on inspection and explosion-proof lighting fixture within a paint spray room?-R.H.

A lighting fixture or any other A. electric energy consuming device must dissipate heat and should the exterior of the fixture or motor become coated with paint pigment, it soon loses its ability to dissipate heat as fast as it is produced, with the result that the device will eventually become hot enough either to set fire to the accumulated paint or to destroy itself. Because of this, Section 5003 of the Code reads as follows:

No electrical equipment or apparatus shall be installed or used in any location where readily ignitable residues may be deposited, except that wiring in rigid conduit or boxes or fittings containing no taps, splices or terminal connections may be installed in such locations."

Therefore it is necessary to illuminate such areas by means of fixtures mounted outside the area and separated from it by wire glass panels. Incidentally, care must be used to mount the fixture far enough away from the wire glass panel so heat from the fixture will not crack the glass, and it is also an excellent idea to keep the inner surface of the wire glass panels covered with a light coating of grease so the spray paint cannot bond itself to the glass surface. Wire glass of the clear type is not as smooth as other glass sheets and unless the surface is kept greased, the light levels will drop very rapidly .- G.R.

#### Load Computation

Q. Our local inspector has orjob, a 60 ampere main switch together with 8-15 ampere circuits and one 50 ampere range circuit, in a one car garage, located in the basement of a new private residence. The owner contends that it is against the National Electrical Code to so place this equipment. Is this so?-D.F.

As the range circuit probably A. does not feed through the house service switch, the range load does not figure in the house load computation. Also, there must be one small appliance circuit and possibly two. This one circuit, or two of them, also do not figure in the load computation.

The inspector therefore, evidently based his computations on a requirement for 6 or 7-15 ampere circuits, or a load of approximately 90 amperes (10.800 watts), or 105 amperes (12,-600 watts), which would be at the rate of 2 watts per square foot for 5400 or 6300 square feet respectively. Of course if the area of the house is less than indicated above, the computed load would be less, in which case, few circuits might be permissible.

A 60 ampere service switch however, seems to be out of line with the above indicated load. A 100 ampere switch would seem to be more desirable.-F.N.M.S.

#### Wiring Devices

The electrical inspector has refused to accept surface wiring devices or any other wiring device made out of bakelite in any building in which farm animals are kept. The devices I have used have all been U. L. approved and I cannot understand why they cannot be used for farm work. Do you have the answer for this?-M.H.R.

Yes the inspector was correct A. in refusing to accept bakelite wiring devices in buildings housing livestock. This is not a National Electrical Code question and therefore probably does not belong in this column, but as it is timely, it seems advisable to include it.

Some plastics are more susceptible to electrical tracking than others and bakelite because of its weakness to electrical tracking cannot safely be used to support uninsulated current carrying parts in buildings where moisture and most types of dust are present. In buildings housing livestock, experience has shown that a conductive path is formed between uninsulated current carrying parts of opposite polarity by a film of moisture and dust. Current passing through this film carbonizes the bakelite beneath it until it too becomes conductive. The amount of current flowing through the bakelite increases until it opens the overcurrent device protecting the circuit and in most cases by that time the device itself has either exploded or is on fire.

Bakelite wiring devices have been used for many years in dry locations and there is no logical reason why we cannot go on using them in such build-



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ings, but in buildings housing livestock or similar damp and dusty locations, they will prove unsafe. Several companies have already recognized this problem and are now producing wiring devices made of a plastic known as Urea which is less subject to electrical tracking. When the conductive paths of moisture and dust form on a Urea device they clear themselves without carbonizing the plastic; hence these devices can be expected to serve a safe and useful life.

Your attention is directed to the fact that outlet boxes, covers and any other type of enclosures or devices made of bakelite which do not contain or support uninsulated current carrying parts are not hazardous when used within buildings housing livestock. Furthermore, this problem of electrical tracking is most serious in those areas where considerable cold weather is experienced each year.—G.R.

#### Lampholders on 20 Ampere Circuits

Is it permissible under Sections 2123A and 2126A to connect a group of four sections of disappearing footlights, having mediumbase, porcelain keyless receptacles with soldered No. 14 connecting wire to a 20 ampère circuit breaker, above footlights being considered as a fixed lighting unit?—L.W.

Sub-paragraph c-2 of Section 2123 provides the exception which permits the use of keyless porcelain lampholders on 20 ampere branch circuits.

Of course the last sentence of Section 5242 should be complied with so that the disappearing footlights are automatically disconnected from the circuit when they are in the recessed position.—F.N.M.S.

#### **Motor Analyzers**

For several years past I have been concerned over the problem of permitting the use of the so-called motor analyzers found in every automobile garage today. Most of these devices are mounted on casters and are usually within four feet of the floor and contain many types of devices which could ignite gasoline vapors. Should I continue to accept their use without exception, or does the Code actually prohibit their use?—F.F.O.

A The National Electrical Code definitely prohibits the use of most of the present motor analyzers

used today in automobile repair shops, but it also prohibits the use of the ordinary trouble lamps, many of the motor operated tools now used, and the portable battery chargers so common today. Section 5103 of the Code reads as follows: "Equipment which tends to produce arcs or sparks, such as cutouts, switches, receptacles, lampholders, charging panels, generators, motors or other equipment having make or break or sliding contacts, when located within four feet of the floor shall be of a type approved for use in a Class 1 Division 2 location as defined in Article 500 of this code." Then under 5013, 5016, 5017 and 5018 you will find that in general the component parts of the average motor analyzer would have to be suitable for use in a Class 1 Group D Division 1 location to comply with the Code. The same is true of the other electrically operated tools and equipment in common use today.

It is my personal belief the Code should be changed to require a definite number of air changes per hour, say from eight to twelve, and to permit the present four foot rule to be ignored when proper ventilation was provided.—G.R.

#### The Thinner Insulations

According to the 1947 Code, how many No. 14 SN or RU wires are allowed in a ½ inch conduit when rewiring an existing raceway?

How is the number of wires computed for "old work"?—W.E.R.

Unless the full conditions mentioned in Table 11 namely, "for rewiring existing raceways for increased load where it is impracticable to increase the size of the raceway due to structural conditions" are present, the limitations in Table 4 or the first line of the table in Table 11, must be followed. This applies of course, where the existing conduit can be replaced with larger conduit.

Therefore unless the conditions quoted above are present, not more than four No. 14 Type T (SN) or Type RU wires should be installed in ½-inch conduit.—F.N.M.S.

#### **Commercial Cooking**

Several months ago a question pertaining to the demand factor permissible for conmercial cooking devices appeared in this column and in my answer I suggested that no demand factor be allowed due to field experience. Since then correspondence from

# Extra-Easy Threading OF SHORT NIPPLES



... "This REDID nipple chuck sure cuts the monkey-business out of threading short nipples."

### New RI Mark Nipple Chuck fits any threading machine, power drive or vise

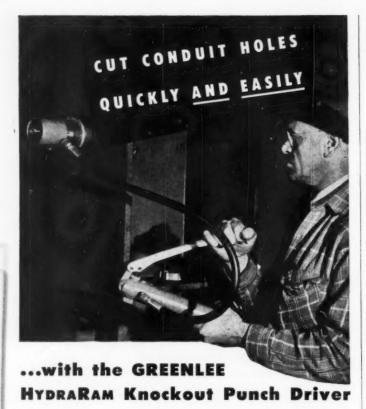
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Here's the simplified, extra efficient way to enlarge knockouts, or cut entirely new openings, for conduit up to 4". Powerful, portable HYDRARAM for GREENLEE Knockout Punches develops over eleven tons of hydraulic pressure to drive Punches through 10-gauge metal in a jiffy. Operation is simple as A. B. C.—makes the job a snap. HYDRARAM set includes a Hand Hydraulic Pump, a High Pressure Hose and an Adapter with extra sleeve to accommodate all

GREENLEE Knockout Punches for making holes for ¼" up to 4" conduit. Attachments also available for ½" conduit Punches and GREENLEE Radio Chassis Punches. Set is packed in metal carrying case with compartment for Punches as illustrated. May be purchased with or without Punches. Write for literature. Greenlee Tool Co., 1745 Columbia Avenue, Rockford, Illinois.





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Code Committee members indicates it was not their intent to permit the use of Table No. 29 for any commercial cooking devices and that the heading for this table will be changed when the Code is revised so no one will be able to infer that it might apply to commercial cooking.

Therefore when figuring feeder or service capacity for commercial cooking devices, be sure to base your copper size on the sum of the name plate

ratings .- G.R.

#### Common Neutral For Branch Circuits

We have an occasion to use four circuits in one long run. The circuits will contain lighting outlets only and will be balanced. Will it be possible to use a No. 10 TW neutral as a common neutral and 4 No. 12 TW wires for the four circuits? It will be using a common neutral for two 3-wire circuits.

The Code authorizes this for feeders in Section 2204. I have been told that one of the older code books did authorize this for branch circuits in the past. Our local inspector thinks that it would be all right but would like to have an opinion. Can you help

us?-T.L.W.

A rule in previous issues of the Code similar to the present Code rule in Section 2204 for "Common Neutral Feeder", permitting a common neutral for branch circuits, was deleted from the code a few years ago with the intent that the use of a common neutral for branch circuits, would thereby be prohibited.

Therefore the proposed scheme would not be permissible.

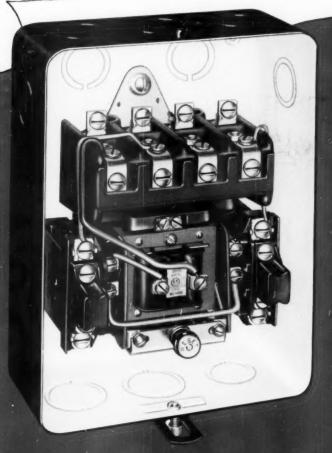
A direct prohibiting rule would be preferable to the manner in which it is now handled in the Code.—F.N.M.S.

#### Wiring for Display Cases

We plan to wire a number of display cases for a department store here and after examining several new cases already wired, we found that \( \frac{1}{2} \) inch tubing had been used. The local inspector has informed us we have to use \( \frac{1}{2} \) inch or larger tubing or he cannot approve the work. How could one case be wired with the smaller tubing and still be O.K. to use if it is not in conformance with the Code?—P.L.Y.

A. The N. E. Code under Section 3485 states ½ inch electrical metallic tubing is the smallest size that may be used with two exceptions, those

# mitation is the plattery of plattery Charles C. Colton



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being for under-plaster extensions containing only a single conductor and for 6 foot or shorter leads to motors. The N. E. Code is intended to control work done by journeymen in the field only, therefore it is possible for a device to be made on a production line in a factory without complying with the Code requirements provided a test conducted by the Underwriters' Laboratories indicates the device in question does not constitute a hazard to life or property. When such a product is approved, the construction of all additional units is under constant supervision of Underwriters' Laboratories engineers to assure continued production of safe devices. This type of supervision is not possible for other than production line construction or assembly of electrical equipment and therefore it is possible for an Underwriters' Laboratories labeled display case to be wired with EMT smaller than that permitted by the Code for field installation.-G.R.

#### Conductor Runs

When vertical conduit runs are fastened to the interior building wall and pass through drilled holes in the concrete floors, are they considered existing raceways where it is not practical to increase the size of the raceway to permit increasing the percentage of conduit fill?

A. No. The provision contained in Table 11 of the Code which permits 50% fill for three or more conductors is limited only to concealed raceways, and the Interpretations Committee has ruled that vertical runs passing through floors only are not to be considered as concealed runs.



NEW CHAIRMAN of NECA Chapter Managers Institute is W. J. Varley (left) of San Francisco. E. R. Cornish (right) of the same city is director of NECA's Pacific Coast office.

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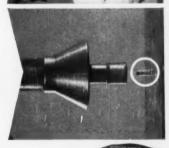
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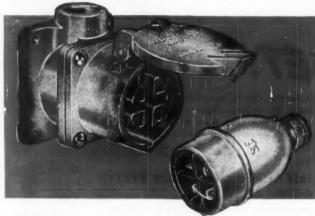
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with cast metal housings in many types for circuit breaking and disconnect service. 30 amperes. 125 volts DC, 250 volt AC—1, 2, 3, 4, 5 and 6 pole. 60 amperes, 250 and 600 volts—3, 4 and 5 pole. 100 ampere, 250 and 600 volts—2, 3 and 4 pole. Also many special types, fusible and fuseless, for varied applications.

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### **Industrial Electrification**

#### Induction Motors In Industry—Part I

A discussion of ac formulas and definitions, induction motor characteristics and construction features, applications and methods for control.

NDUCTION motors are the work horses of modern industry. This is particularly true in the medium and high speeds because power factor and efficiencies are quite acceptable for most applications when speeds rise above 500 rpm.

The ruggedness and simplicity of squirrel-cage motors makes them a first choice where constant speed is acceptable. The every day needs of industry find squirrel-cage motors filling almost every conceivable constant-speed drive requirement.

Where speed control or frequent reversing is desired, or where high controllable torque and extra-low starting current must be associated, woundrotor (slip-ring) induction motors are used.

Before discussing induction motor characteristics, applications and control, however, it would be well to briefly review some ac formulas and definitions, motor insulations and construction features.

Ac voltage alternates regularly in value and in direction. One complete alteration is one cycle or 360 electrical degrees.

Frequency (f) is the number of such alternations per second. Perfect alternating current is a sine wave with no ripples or distortions.

Phase: If the electrical power is supplied over two circuits, in one of which the voltage reaches zero and other corresponding values 90 degrees later than in the other circuit, the service is two phase. If the power is provided in what amounts to three circuits which reach corresponding values at 120 degree intervals, the service is three phase. (Fig. 1.)

Volts are a common measure of electrical pressure,

Amperes are units designating the rate of flow of electric current.

Resistance is the measure of hindrance or impedance to current flow on direct current. Resistance is measured in ohms. Current is equal to

By G. L. OSCARSON
Chief Applications Engineer
Electric Machinery Manufacturing Co.
Minneapolls, Minn.

voltage divided by ohms resistance. Inductance: Any device with iron in the magnetic circuit has what amounts to magnetic inertia.

Inductive reactance: The effect of inductance varies with the frequency and the term Inductive Reactance is used to express this effect.

Impedance: On ac circuits the flow of current is limited by both resistance and inductive reactance. The combination of these two elements is known as impedance.

Power: Electrical power is meassured in watts, kilowatts or mega-

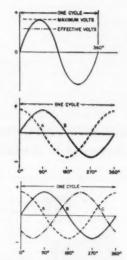


FIG. 1. Single-phase ac service follows sine wave. Two-phase service finds corresponding voltage values 90 electrical degrees apart. This interval is 120 degrees with three-phase service.

watts. A watt is the product of one ampere effective current flowing at a pressure one effective volt. In ac a further condition is that voltage and current must be in phase.

Assuming that voltage and current are in phase,

W = EI on single phase service = 2EI on two-phase service

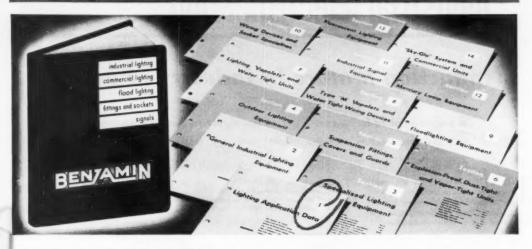
 $= \sqrt{3EI}$  on three-phase service.

If the current and voltage are not in phase, that is, do not reach corresponding values at the same instant, the resulting product of current and voltage is apparent power instead of actual power. Apparent power is measured volt-amperes rather than in watts. With this exception, the formulas above are the same.

Power factor is the factor by which apparent power is multiplied to obtain actual power. (Fig. 2) In most magnetic circuits the current lags the voltage. (Fig. 3) when both current and voltage are both positive or both negative, the resulting power is positive. When either the current rate or voltage wave is negative and the other positive, the resulting power is negative. Net power is the positive area minus the negative area, Apparent power is the sum of the two areas. Power factor is the net divided by the apparent power. Power factor of induction motors is affected by variations in line voltage.

Magnetizing Current: Transformers, motors and other apparatus with magnetic circuits containing iron must be magnetized in order to operate. It is often convenient to speak of the input current as having two components, one a load component which is in phase with the voltage, the other a magnetizing component at right angles and lagging the voltage. This lag would be 90 electrical degrees. (Fig. 4) The load component registers on the watthour meter and does the actual work. The magnetizing

#### **An Important Statement by BENJAMIN**



### Concerning the NEW BENJAMIN CATALOG REPRINT

For architects...engineers...electrical contractors and others having repeated need for lighting equipment data.

The Benjamin Catalog is generally accepted as the most complete and authoritative presentation of industrial and commercial lighting equipment. As the leading source of information, the demand for copies has long exceeded the supply. The expense of production of a book of this magnitude has of necessity limited the number printed. Further to those who recommend, plan or specify lighting equipment, the new reprint contains much

additional information of extreme value, such as:

- An Entirely New 32-Page Section 1 on Lighting Equipment Application.
- New specification data and listings of all New Benjamin Lighting Equipment Advancements such as:
- "Sky-Glo" Luminous Louvered Ceilings.
- "Magna-Fle 75" Fluorescent (for new 96" lamps)
- "Vapor-Tite", "Sealed-Flo 40" and TX Units for damp and dusty location lighting.
- Recessed Hounted Fluorescent Units.
   "Shield-Flo" Fluorescent.
- "Spring-Lox" Lampholders

DISTRIBUTION of the new 424-page catalog reprint has been in progress since last January. You may have received your copy upon the request of a Benjamin Representative or Distributor. However, if you did not

receive it as yet, may we restate our previous announcement: "Benjamin wants everyone who has repeated and continuous use for the catalog to have one without cost or obligation of any kind. Distribution is restricted solely to insure such persons obtaining their copy."

Further, we are most anxious that such persons SECURE THEIR COPIES IMMEDIATELY to avoid disappointment through the exhaustion of our limited supply. To insure your obtaining your copy, please send in your request immediately, on your company letterhead, giving your full name, title and department.

#### Section 1 of the Catalog Reprint is Available in Booklet Form

All those interested in Planned Lighting and all those whose present Benjamin catalog data is not up-to-date or sufficient are urged to obtain a FREE COPY.

So that no one may be without the valuable information contained in the new Section 1 of the Reprint Catalog, this 32-page section is being made available without cost or obligation to all who write for it.

Entitled "Manual of Lighting Application Data", the booklet brings you the principles and data needed to develop good planned industrial lighting installations. Shows how to insure success of Planned Lighting through proper application of 12 basic Benjamin Light-

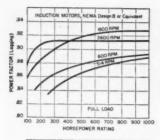


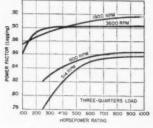
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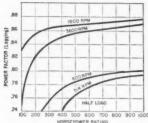


FIG. 2. Approximate power factor of induction motors.

component puts energy into the magnetic circuits of the apparatus during  $\frac{1}{4}$  cycle and returns it to the system the next  $\frac{1}{4}$  cycle.

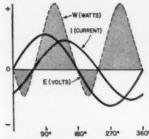
Torque is the turning effort at one foot radius expressed in pound-feet. It is a measure of the ability of a motor to develop power.

Locked-rotor torque (also called breakaway or starting torque) is the minimum torque a motor will develop at rest for all angular positions of the rotor, with rated voltage applied at rated frequency.

Full-load torque is the torque necessary to produce rated horsepower at full-load speed. In pounds at one foot radius it is equal to the horsepower times 5250 divided by the full-load speed.

Accelerating torque is the net difference, at any speed, between the torque required by the external load and the torque developed by the motor.

Breakdown Torque is the maximum torque a motor will develop, with rated voltage applied at rated frequency, without an abrupt drop in speed. Starting and breakdown torques will vary as the square of the applied volt-



**FIG. 3.** Volts, amperes and watts where current lags voltage by 60 degrees.

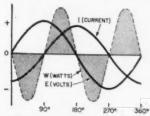


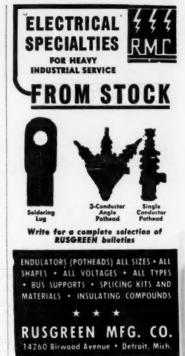
FIG. 4. When voltage and current are 90 degrees out of phase the power is all reactive.

age. In some cases the starting or accelerating torque available at reduced voltage may be insufficient to start or bring the connected load up to speed.

Synchronous speed is the speed an induction motor would reach if there were no slip. It is the speed at which the magnetic field, in effect, rotates about the stator.

Full-load speed and slip: As explained later, the rotor of the induction motor can never run at quite synchronous speed. The difference between synchronous speed and operating speed is known as slip. This is usually expressed in percent of synchronous speed. If the line voltage is 10 percent high, the slip will be about 1 point. If the line voltage is 10 percent low, the slip will be increased about 1.5 points.

Efficiency is the measure of the ability of the motor to convert electrical input to mechanical output. (Fig. 5) The kilowatt is the common measure of electrical input. The horsepower is the common measure of mechanical output. A horsepower is equal to 746 watts. A kw equals 1.34 hp. Recognized induction motor losses are stator no-load iron loss, stator copper loss, stray lead loss, rotor copper loss, friction and windage. Efficiency is equal to output divided by input or, in another form, input minus the losses, divided by input. The internal torque developed by the squirrelcage induction motor is due to the losses generated in the rotor. In







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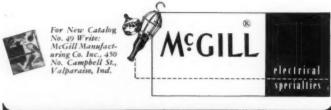
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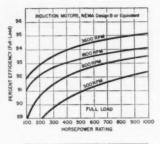


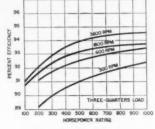
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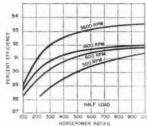


FIG. 5. Approximate efficiency of induction motors.

the case of a wound-rotor induction motor, the losses in the external resistor are also included.

#### Insulation and Temperature Rise

Ambient conditions: It is assumed that the temperture of the air surrounding a motor is not over 40 degrees C (104 degrees F) and that the altitude does not exceed 3300 feet.

Total temperature is important in that it directly influences life of the insulation of the motor. It is generally accepted that each 10 degrees C rise in temperature will approximately halve the effective life of Class A or Class B insulation.

Class A insulation consists of cotton, silk, paper or other organic materials impregnated with insulating varnish; molded or laminated phenolic resin (bakelite) with cellulose filler; films and sheets of cellulose acetate (cellophane); and enamels as applied to conductors.

Class A insulation is based on a total allowable temperature of 105 degrees C as being suitable for reasonable insulation life. This is based on:

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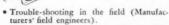


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performance of this tool, now standard equipment with many electrical contractors. It possesses the stamina, ruggedness and reserve power that save time on every job. Speeds: 650, 1000, 2000, 3500 and 5000 R.P.M. Capacities: for boring in wood,  $\frac{3}{8}$ ",  $\frac{1}{2}$ " and  $\frac{5}{8}$ "; for drilling in steel,  $\frac{3}{8}$ ",  $\frac{1}{4}$ " and  $\frac{5}{16}$ ". Wts.  $\frac{3}{8}$  to 41/4 lbs. Ball and roller bearing equipped - amply air cooled and cool running.

SEE YOUR DISTRIBUTOR . . . or write us for Folder 113. Series "A" HOLE-SHOOTERS are priced at \$38.00 to \$42.00.

#### 6" Portable Saw with 1HP Motor

Another favorite of all contractors in the construction field - most powerful 6" Saw built. Complete with ball and roller bearings . . . depth gauge . . . miter shoe . . . rip guide . . . telescoping guard . . . sawdust blower. Full 2" straight cut; 13/8" bevel cut at 45°.

Write for Folder 660 . . . and give us your distributor's name. "You'll buy it





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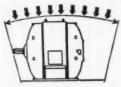


FIG. 6. Drip-proof motor has protective enclosure preventing entrance of water dropping not more than 15 degrees from vertical.



FIG. 7. Splash-proof motor has protective enclosures and baffles preventing water entering at not more than 100 degrees from vertical.

40 degrees Cambient temperature 40 degrees C temperature rise by the thermometer

15 degrees Chot spot temperature allowance

10 degrees C service factor

105 degrees C total temperature.

The 15 degrees hot spot allowance is based on the assumption that the hottest spot within the motor is 15 degrees C hotter than the maximum temperature observable by an external thermometer. The 10 degrees C service factor is always used on general purpose induction motors to permit flexibility of operation. This allows a 40 degree rise motor, open or dripproof construction, to carry 15 percent overload continuously without a temperature rise which would be unduly damaging to insulation.

Class A insulation is considered standard and will withstand the conditions found on the majority of applications. It is mildly resistant to moderate amounts of moisture, weak acids or alkalies, non-conducting abrasive material, dust, oil, and other similar materials

Special Class A insulation consists of organic materials, processed to a greater degree than Class A insulation. It should be used where dyehouse or packing house insulation is specified. It is highly resistant but not "proof" against severe conditions of moisture, dampness, conductive or abrasive dust. acid or alkali dusts or vapors.

Class B insulation consists of mica. asbestos, fiber glass and other inorganic materials. Organic materials are commonly used as binders but may be used for structural purposes only.

Permissible total temperature of Class B insulation is 130 degrees C.

### FLUORESCENT GOES FLEXIBLE!

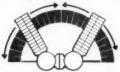
### Now! For the First Time — Circles! Curves! Any Angle!

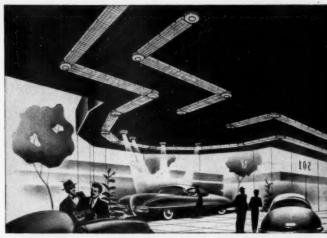
Sensationally new in concept, qualitybuilt in the Day-Brite tradition, PLEXOLINE is making headline news. Since its recent debut, lighting experts have discovered and praised Plexoline's unprecedented ability to achieve unlimited custom-lighting effects without premium cost.



#### SIMPLE, PRACTICAL PRINCIPLE

Three basic elements form the PLEX-OLINE system: 1. Linear section; 2. Circular accent unit; 3. Adapter fitting. The two illustrations show how the elements are used in combination to form any lighting pattern desired. All elements are complete in themselves, may be used individually.





#### PLEXOLINE AND IMAGINATION—AN UNBEATABLE SELLING COMBINATION!

Never before such wonderful possibilities for store and showroom lighting! Dramatic, beautiful PLEXOLINE creations put light where you want it . . . how you want it! Straight linear sections for offices, schools, colleges, banks, public buildings.

### Plexoline

#### THE ONLY LIGHTING SYSTEM WITH TRULY UNLIMITED "FLEX-ABILITY"

What does PLEXOLINE mean to you? It means new freedom for your imagination. It means a line of light following a gently curving wall contour... angular patterns of light ... circles... any design. It means—for the first time in history—all the advantages of custom-lighting with

all the economies of a mass-produced system of fixtures.

Today, send for the whole amazing story of PLEXOLINE. Fill out and mail the coupon below. See for yourself what PLEXOLINE's unique "flex-ability" can do for you!

#### THE PLEXOLINE SYSTEM

LINEAR SECTIONS—For Slimline and standard Fluorescent, 2- and 4-light, 4', 6', and 8' lengths, surface or suspension mounted. Albalite glass side panels, interlocked steel louvers, finished in HOT-BONDED SUPER WHITE enamel. CIRCULAR ACCENT UNITS—15" and 21" diameter, with fixed Controlens\* or adjustable spot mechanism. Luminous sides. Surface mounted only.

ADAPTERS — Uniform, die-formed, allsteel—in two sizes to fit circular units.





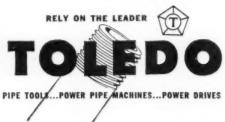
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Bring your costs down-save up to 80% on pipe threading time by using a portable TOLEDO No. 999 Power Pipe Machine instead of hand methods!

Gives you high production! The Super Model threads 2" pipe in 22 seconds ... or 30 seconds with Standard Model. Cuts off 2" pipe in 10 seconds. It's versatile-quickly changed for all pipe sizes up to and including 2". It's rugged, compact, low in cost . . . with proven performance and Toledo dependability! Ask your distributor for complete details and price. Write for new catalog. The Toledo Pipe Threading Machine Co., Toledo, Ohio. New York Office: 165 Broadway, Room 1310.



Class B insulation is frequently used where extremely high ambient temperatures may prevail. Class B temperature is based upon:

40 degrees C ambient temperature 70 degrees C temperature rise by thermometer

20 degrees Chot spot temperature allowance

130 degrees C total temperature

Class H Insulation: Newly developed high temperature insulations, such as silicones, permit temperatures of 170 degrees C. However, full advantage of this permissible temperature in reduction of motor size is usually not possible. Other factors, such as torques and bearing temperatures, limit frame reduction and possible temperature rise.

Tropical Insulation: Motors operating in the tropics may encounter any or all of the following conditions: excessive moisture, excessively high ambient temperature, corrosion, fungus, insects, termites, vermin, lizards and rats. Such units will require special tropical insulation.

#### **Protective Constructions**

Open type motor is a self-ventilated motor having no restriction to ventilation other than that necessitated by mechanical construction.

Drip-proof motors have ventilating openings so constructed that drops of liquid or falling particles reaching the motor at an angle not greater than 15 degrees from the vertical cannot enter the motor either directly or by striking and running along a horizontally or inwardly inclined surface. (Fig. 6) This is the recommended minimum protection for the great majority of induction motor applications.

Splash-proof motors have ventilating openings so constructed that drops of liquid or solid particles falling on the motor or coming straight towards it at an angle not greater than 100 degrees from the vertical cannot enter the motor directly or by running along the surface. (Fig. 7) Splashproof motors are frequently used in plants where floors may be hosed down. They are also suitable for outdoor installation where drifting snow may enter the machine. Temperature rise of standard splash-proof motors is 50 degrees C.

Special protection is occasionally required, such as dust-proof, waterproof, submersible and explosionproof units. Totally enclosed, fancooled, open or enclosed separately ventilated, and explosion-proof motors are examples of constructions used for special applications. In some cases it is not possible to avoid these types of construction. However it is often pos-



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THREADING ... speedy, accurate.



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- All-bakelite body short and compact cut away on ends to allow more room in box for cable clamps, locknuts, bushings
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**Built to Government Specifications** 

15 A., 125 V.; 10 A., 250 V.

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sible to arrange motor location so standard motors may be used. This should be done whenever possible.

#### Mechanical Constructions

Coupled type (bracket bearing):
Most induction motors are of the
coupled bracket type. These motors
may be open, drip-proof, splash-proof,
or of various other protective constructions.

Coupled type (pedestal bearing): Large or slow-speed induction motors generally use pedestal-type bearings. The motor is complete with base and pedestals.

Belted type motors are also of the same general construction as coupled type units. Belt tightening rails are usually provided to maintain proper belt tension. In extreme cases, where belt tension is very high, an outboard bearing is required.

Flanged mounted (overhung) type is used for direct connection to air compressors. The stator of the motor is bolted to a flange on the compressor frame, hence the name. The rotor is mounted on an extension of the compressor shaft.

Vertical motors are commonly used to drive deep well vertical shaft turbine-type pumps. To facilitate adjustments of clearances between the impellers and the pump housing the motor is sometimes provided with a hollow shaft. The pump shaft extends upwards through the hollow space and is supported by the motor shaft. Vertical adjustments are readily made by means of a nut on the upper end of the pump shaft.

Special constructions of induction motors are required for various special requirements. Possible variations of mechanical construction are almost limitless.



IN FLINT, Michigan, electrical inspection activities are handled by assistant inspector R. S. King (left) and his chief A. W. Taylor. Here, they are discussing U. L.'s list of approved equipment.

Precision-Built Electrical Equipment 125 BARCLAY STREET, NEW YORK 7, N. Y.





these 4 low-cost modules are the "building blocks" of a perfect custom-fitting lighting installation...



A 4 14-Watt T-12 15" Type F Lamps



32-Watt 12" Circline





medules fit together perfectly end to side, end to end, side to side ... to form more than 50,000 different lighting patterns...to fit any ceiling shape or size...mixing all light sources in one harmonious system... with equal brightness throughout (no dark sides or ends)...so you can put the light where it is needed!

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## **SOLD** wherever you tell the module selling facts:

module is custom-fitting Here's the new lighting that fits any commercial interior to a "T". Four basic MODULE units are the "building blocks" or "dominoes" of light. They fit together easily, economically, to form over 50,000 different petterns. They custom-fit any room shape or size. They put the light exactly where it's needed. MODULE is the only lighting that custom-fits with standard low-cost units.

module delivers 20% MORE LIGHT Proved in actual use-MODULE delivers 20% extra light per unit! Yes-the module translucent plastic molded louver passes 20% MORE LIGHT. This means more light per dollar-fewer fixtures required to meet footcandle specifications. This means more light, better light at no more than the cost of ordinary fixtures.

module installations are never obsolete No MODULE lighting Bystem is ever obsolete. Here's why: As lighting needs change, more units can be added at any time, at any point in the system-without installing a single new electric outlet box because MODULE units connect together electrically and mechanically. MODULE lighting is never "locked-in"-the "building blocks" of light simply slip into place easily and economically exactly as required.

module is newest, finest And there's nothing in lighting that will stay newer and finer than MODULE. Yes-a MODULE installation remains modern for years, because: it custom-fits and "grows" with every lighting need; it delivers more light; its appearance has an undated "always contemporary" look. No ordinary fixtures can match these MODULE advantages.

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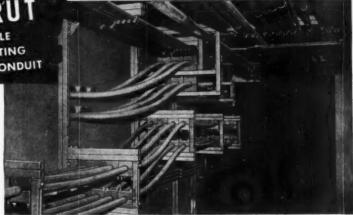


MITCHELL MANUFACTURING COMPANY 2525 N. Clybourn Avenue . Chicago 14, Illinois In Canada: Mitchell Mfg. Co., Ltd., 11-25 Davies Ave., Toronto

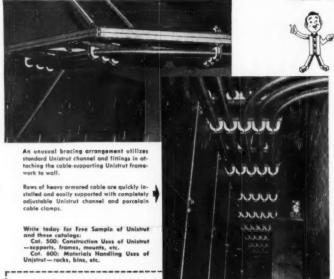
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THE MOST FLEXIBLE
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Notice Unistrut's trim steel framework. Note too the Unistrut porcelain and maple clamps that hold the heavy cable and conduit firmly in place.



#### THIS IS UNISTRUT!

Unistrut is metal channel with a continuous slot. You simply insert the Unistrut spring nut into the channel at approximate point where attachment of another framing member is desired, slide to exact location and bolt to Unistrut fitting. Unistrut includes concrete inserts, pipe and ca'ple clamps, roller pipe supports, brackets, and many other standard parts which in combination provide the world's most flexible system of support or suspension.

Unistrut is trim framework—provides great strength without bulk. It's easy to work with, lasts indefinitely, and the finished structure assures neat and orderly appearance. With it you can build practically everything—all types of framing, mounts, shelving, racks, tables and benches, cable, conduit, pipe and tubing hangers and supports, fluorescent fixture supports and many other structures with only a hacksaw and a wrench.

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### In the News

#### EEI Sales Programs To Benefit Contractor

Aggressive selling was the theme at all sessions-commercial, industrial, farm and residential-of the Sixteenth Annual Sales Conference of the Edison Electric Institute held at the Edgewater Beach Hotel, Chicago, April 3-6. As the mechanics and details of the various programs were unfolded, one significant fact was ever present: there will be a healthy increase in business volume for the electrical contractor. For he is the one who will have to install the conduit. wire and outlets to serve the power utilization and equipment applications that will be promoted by the nation's leading power companies.

Reasons for the general optimism about this mid-century push, as pointed up by Harry Restosfski, chairman, EEI commercial division

general committee, are:

Utility reserve generating capacity increased to 12 percent last year; will approximate 15 percent this year.

Aggressive sales programs are being launched throughout the country.
Unsold electrical equipment markets are still growing.

Utility sales forces and sales expenditures are being increased.

Industrial power sales are up.

Ninety-three percent of 86 utilities surveyed will conduct lighting sales programs this year—73 percent including farm lighting; 82 percent, residential; 90 percent, industrial; 96 percent, commercial lighting.

#### In Key Position

Other encouraging signs: By the end of 1950 approximately 96 percent of all U. S. farms will have electric service; utilities are beginning to show an interest in all electric home heating; many power companies have returned to full subsidy of electric range and water heater wiring costs; an increasing number of utilities are again merchandising appliances.

The electrical contractor's key position in lighting equipment sales was clearly established in a report of the Cooperative Lighting Survey in Indianapolis, presented by Frank Mansfield, director of sales research, Sylvania Electric Products, Inc., New York. Of those Indianapolis establishments whose lighting had been modernized, 38 percent first consulted their electrical contractor; 26 percent con-

sulted no one; 10 percent talked to friends and business associates; nine percent, electrical jobbers. The rest, in small percentage points, was divided between architects, general contractors, lighting engineers, manufacturers and utilities.

Mansfield's report also indicated the need for better lighting in this representative city, picked for its typical industrial, commercial and residential make-up. Some 62 percent of the area had up to 20 footcandle intensities (more than half of these had less than 10 fc.); only nine percent had better than 46 fc., compared to an IES recommended level of 50 fc. for all

areas surveyed.

The big job of extending distribution systems to the farms of this country is about over, stated Grover C. Neff, president, Wisconsin Power & Light Company. By the end of 1950 electric service will be available to 96 percent of U. S. farms, he added and cautioned that the development of farm electrification to the point where electric power is efficiently applied to all uses is only well started. Citing statistics from his own Company, Neff stated that average farm kwhr. consumption in 1949 was 3,100-an increase of 160 percent over 1940, Based on the increase in the past five years, he sees an average farm use of



CONTRACTOR-DEALERS Lloyd A. Gerstenberger (left), Art-O-Lite Co., Inc., Galesburg, Ill., and H. J. Herrin, Herrin & Zittle Electric Co., Springfield, Ill., discuss current business conditions.

about 5,700 kwhrs. in 1955. Mr. Neff urged utilities to make thorough load, voltage and interruption surveys of their rural lines; estimate average farm use for 10 years ahead; then make every effort to improve voltage regulation and reduce outages.

Dean L. L. Rummell. Ohio State University told a farm luncheon group that we have only a start toward modernization of the 1950 farm home. The challenge today is to bring electrical conveniences to the five million farmers with electric service. Farmers, today, are more efficient than a decade or two ago; have the cash to buy labor saving equipment; Dean Rummell concluded.

#### Electric Heating

F. A. Compton, vice-president, Detroit Edison Company, cautioned power companies against developing a negative attitude towards electric house heating. They must give the same—and perhaps more—consideration to this application that they do to any other newly developed use; must remain thoroughly acquainted with all developments in this field; have personnel available who are thoroughly and completely familiar with its use to assist in its development, Compton added.

Returns from 32 of 36 utilities surveyed nationally by an EEI committee showed that 10 companies had no house heating installations; only seven discourage use of electric heating while 25 remain neutral but give customers complete explanation of system advantages and disadvantages. Fifteen companies have installed metering equipment on house heating installations. While 17 companies apply the residence rate and one the commercial rate, four companies provide a special rate including a charge per kilowatt of demand with 13 to 2 cent kilowatt hour charges plus a fuel adjustment. Residence rate paid for heating per kilowatt hour ranges from .8 to 3.2 cents with an average of 1.9 cents.

The number of complete house heating installations by utilities range from one to 145. Connected load per installation varies from 4 kilowatts in a 3,200 cu. ft. home to 43.7 kilowatts in a 27,000 cu. ft. home. Average for a 9,500 cu. ft. home is about 12 kilowatts. The average installation as reported uses .24 kilowatt hours per degree-day per kilowatt installed in an insulated home: non-insulated homes use .32 kilowatt hours. While



Test is the only instrument of its type that can measure both AC and DC. Cannot burn out for it has no windings. Safe, convenient and light in weight. Interchangeable scale ranges up to 1000 amperes. Five types to accommodate cables up to 3\%", bus bars up to 4\2" x \\2".

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RESPONSIBLE FOR SUCCESS of Milwaukee Electrical Maintenance Engineers' Industrial Electrical Exposition were exhibit committee chairman E. C. Siller (left), chief electrician, Phoenix Hosiery Co., Milwaukee; and EME president E. H. Tellier, chief electrician, Koehring Co., Milwaukee.

17 of the companies reported active promotion by manufacturers of electric house heating units, predominantly of the glass radiant panel type, none of the utilities are presently planning to promote this load, Compton revealed.

An estimate that one large metropolitan electric company is now receiving some \$7,000,000 per year in increased income from the net new load produced by use of television sets, was reported by E. S. Thomas, general manager, TV Station WOIC, Washington, D. C. Thomas revealed that 5,500,000 TV sets are already in use; TV areas now covered include 60 metropolitan markets, with 60 percent of the nation's population, accounting for two-thirds of all retail sales. The era of year-around, morning-to-night telecasting is fast approaching, he concluded.

The rest of the three-day conference covered such subjects as: school and highway lighting promotions; industrial equipment and power sales promotion; commercial electric cooking, sale and promotion of heavy and traffic appliances and the training of sales personnel.

#### Inspectors Want Simplified Code

Illinois electrical inspectors heard a plea for simplification of NEC wire tables at the annual meeting of the Illinois Chapter, IAEI, held in Chicago. Retiring chapter chairman Anton Pertle, Chicago electrical inspec-

racks.



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to equally close tolerances. As the "Wire-Nut" is screwed on, the spring insert automatically compresses the wires, twists them together and cross threads them in one operation - making a joint that is stronger than the wire itself! The "lifetime"

shell covers the wire-ends and insulates the entire joint . . . "Wire-Nuts" are far easier to use, too. No solder, tape 1 or TOOLS. You get perfect wire joints ! every time-in less time! Make sure you get genuine IDEAL "Wire-Nuts" every one has the IDEAL name plainly molded into the shell.

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ELECTRICAL CONSTRUCTION AND MAINTENANCE . . . MAY, 1950



0035"

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On turns of small radius it doesn't buckle nearly as much, because it's backed one side only. Its premium mica is hand laid and bonded so completely to the glass cloth it holds tight - runs through winding machines like a dream.

Supplied with a silicone varnish for extra-high temperatures, standard varnish for the usual Class B use. Available with single layer of mica in .0035" thickness, double layer mica, .005"; both thicknesses are made in widths of half, three-quarter and one inch.

Send for a sample. Inspect it. Try it. It's the answer to a lot of problems. And don't forget—whatever your electrical insulation needs, National has it, ready for quick shipment—and it's good.



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THEY take punishment and like it—these one-piece, pure copper lugs which afford brute strength without excessive weight, silverplated for top performance.

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Average 50% COOLER than "Ordinary" lugs (Underwriters' approved)

Engineered to permit maximum wiring space where space-saving is paramount. re-usable . . . no loss.

Each LO lug comes in a wide range of wires from 14# to 600,000 cm.; easy to install with ordinary tools. Cost is much lower than coarse, bulkier cast lugs, although superior in performance.





IN CHARGE OF all electrical construction work for Foshee Electric Co., Ft. Worth, Texas contracting and motor repair firm, is Tom C. Metcalf, vice-president of the company. He brings to the firm's engineering department some 21 years of varied experience in the electrical construction field.

tor, suggested the elimination of Type R conductors and concentration on Type RH because of its higher current carrying capacity. Pertle cited the advantage of working under the Chicago Code which has a simplified wire table.

Chicago Building Commissioner Roy T. Christiansen revealed that the city is planning a revision of the 1938 electrical code. Although chronologically old, the present code is flexible in that it permits amendments to keep up to date, he added.

The apparent mystery of the "dual" label appearing on enclosed switches suitable for use as service equipment was clarified by G. E. Manning, superintendent, label service, Underwriters' Laboratories, Inc., Chicago. He explained the operation of the label service; revealed that during an average year, some 600 million physical labels are issued in addition to reexamination markers; noted that about 130 inspectors throughout the country devote full time to checking factory

A behind the scenes description of electrical features involved in television studios and transmitting stations was given by G. William Lang, assistant director of engineering. WGN, Inc., Chicago.

A. J. McGivern, Chicago, chairman of the Electric Association Specifications Committee, outlined the recently developed wiring specifications for "electrical living"-an adequacy standard designed for multiple-dwelling units as well as single family homes. Specifically, the standards assure adequate service capacity for individual apartments (same as for

comparable size single-family house); range circuit and distribution cabinet in kitchen; two individually identified appliance circuits in kitchen; No. 12 wire for all receptacle circuits (one circuit for each 500 sq. ft. of floor space); and ceiling fixtures on separate circuits from receptacles.

While discussing the new requirements for hospital operating rooms, Charles L. Smith, electrical field engineer, NFPA, acknowledged the inspectors' complaints that there are too many reference standards to consult; noted that next year NFPA will publish a single volume containing the NEC and other references pertinent to electrical standards (hospital rooms, fur storage vaults, paint spray rooms, and other hazardous areas).

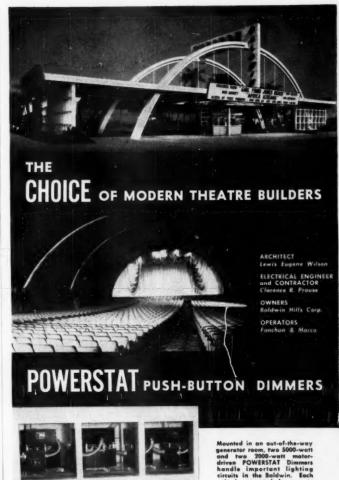
Application and installation techniques involved in the use of underfloor raceways and electronic devices in industry were presented by Vincent P. Otis, Jr., sales engineer, I. A. Bennett & Co., Chicago; and Paul B. Korneke, industrial electronics specialist, General Electric Co., Chicago.

Electrical safety must be promoted in a constructive manner, E. T. Rowland, editor and publisher, Chicago Electrical News, told the inspectors; added that they are the logical persons to carry on a campaign of electrical safety; suggested establishment of an "electrical safety week." Roland pointed out that more BX, wire and electrical accessories are being sold by hardware and mail order houses than by electrical supply firms; questioned whether such material is being installed by established qualified electrical contractors.

At the concluding business session,



LITTLE ROCK, Arkansas contractor Lee Harvill, Harvill-Byrd Electric Co., enjoys huddle with Roy P. Gay, Gay Electric Co., Dallas, Texas.



The Baldwin Theatre in Los Angeles created a \$290,000 sensation among planners and builders of modern movie houses. One feature contributing to the decor and efficient operation of this departure from prosoic theatre design is an installation of POWERSTAT Light Dimming Equipment. Four POWERSTAT units, motor-driven for convenient, remotely-located push-button operation, dim, brighten and blend house, cover, curtain and proscenium lighting—adding to the atmosphere found so pleasing by patrons. Easy to install, economical to operate, POWERSTAT Dimmers have a definite place in the scheme of todays' theatre. Lightinger of the prospective of the prospective

THIS BOOKLET, full of helpful information and suggestions for modern theatre lighting, is yours for the asking. Send for your copy today—it belongs in your file on modern theatre lighting equipment.



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"Carry-All's" exclusive design and its extensive tooling and engineering make possible heavy gauge steel construction (with the correct gauge for each component) and a unique bridge-type underbody . . . And these make possible huskier construction with lighter over-all weight and fewer number of parts than any comparable body on the market—the MORRISON "Carry-All" has greater carrying capacity foe gross which ratings!

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BRAUNLICH BROTHERS, W. Earle and William H., keep acquainted with the status of motors being repaired in the Braunlich-Roessle shop by personally checking unusual conditions found during repair routines.

W. M. Schoknicht, Rockford, Ill., was elected chairman of the Illinois Chapter, IAEI for 1950. Chosen to serve with him were the following: First vice-chairman-Norman H. Davis. Jr., Chicago; second vice-chairman-Carl E. Evans, Danville, Ill.; third vice-chairman-C. A. Wingfield, Chicago; secretary-treasurer-W. J. Alcock, Chicago.

Members of the Executive Committee are: J. Gordon Maltby, chair-man; Leo W. Witz (contractors); Robert C. Bennett (manufacturers); A. J. McGivern (wholesalers).

#### **Lighting Competition** Winners Announced

The General Electric Company's Lamp Department, Nela Park, Cleveland, has announced the winners of 110 cash awards in its \$21,000 nationwide 1949 Planned Lighting competition. This announcement was made at the Edgewater Beach Hotel in Chicago during the 16th annual sales conference of the Edison Electric Institute, early in April.

Described as "an expression of appreciation to those who strive to bring maximum lighting benefits to users of G. E. lamps," the competition was conducted in connection with the electrical industry's Planned Lighting Program.

Awards were based on the 32 outstanding planned lighting installations the hundreds submitted. among Twenty-four of the installations were in the commercial and industrial lighting classifications, and eight in the residential lighting field.

Cash awards of \$100 each were made to individuals who played key roles in planning, selling, supplying and installing the lighting for the best installations. These persons included the electric service Company's lighting representative, the architect, lighting consultant or designer, the fixture manufacturer's salesman, the wholescaler's salesman, and the electrical contractor.

Eight awards each were granted for commercial and industrial lighting installations for communities of three population size groups; 5,000 population or less, 5,000 to 100,000 population, and over 100,000 population. Winning residential installations were judged on a basis of the same population groups.

Twenty-three electrical contractors received awards out of the total of 110 awards made. Five of these awards were in the residential field and 18 in the commercial and industrial lighting field.

Electrical contractors winning awards in the residential field were: John Chapman, Chapman Electric Co., Dayton, Ohio; Harold Tegtmeier, Omaha, Nebr.; Marlin Associates, Houston, Texas; A. Lee Vaughn, Flint, Michigan; and Joseph D. Fletcher, Irwin, Pa.

Electrical contractor award winners in the commercial and industrial lighting classification, covering all three population groups, were: Ivan Harlan, Clark Electric Co., Colville, Wash.; Phil Mosier, Shavertown, Pa.; Mel Day, Brookville, Ohio; Brand Electric Co., St. Clair, Mich.; Gerald Reiter,



GOOD IDEA, comments chief electrical inspector D. J. Talbot of Chicago as he examines new telescoping, non-conductive, plastic sleeve to protect neon sign connections. Joseph Schneiderman (right), one of Talbot's inspectors and inventor of the device, was recently awarded a patent for his design.

# LIGHTING



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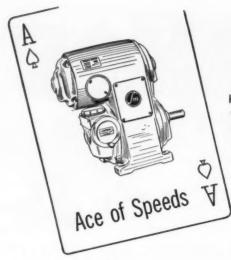
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AT THE HELM of Central Electric Company, Ft. Worth, Texas, motor service organization, is James M. Morgan, a veteran of 34 years experienced in the motor repair field. Morgan has been with Central for over a quarter of a century.

Harrisburg, Pa.; Grant Rice, Electrical Engineers Service Co., Quincy, Calif.; Lyle Gruenther, Unionville, Mich.; Eddie Peake, Jr., Peake-McMorris Electric Co., Pensacola, Fla.; W. V. Woodward, Meade Electric Co., Hammond, Indiana; Louis Dunn, Crook-Dunn Electric Co., Homewood, Ala.; Power City Electric Co., Spokane, Wash.; A. W. Walker Co., Norristown, Pa.: E. C. Baraco, Edison Electric Construction Co., San Francisco, Calif.; Dale H. Watt, Watt Plumbing, Air Conditioning and Electric Company, Tulsa, Okla.; G. L. Grippen, Hoffman Electric Construction Co., St. Paul, Minn.; Fred Edinger, Salmon Electric Co., Syracuse, N. Y.; Prime Electric Co., Brooklyn, N. Y.; and Walter Parkes, T. H. Green Electric Co., Rochester, N. Y.

E. D. Stryker, of the General Sales Division of General Electric Company's Lamp Department and chairman of the G. E. Planned Lighting Awards Committee, said the competition "exceeded our highest expectation in the intense competitive spirit displayed". He said he believed the contest served the purpose of pointing the way toward more and better residential, commercial and industrial lighting projects.

Judges of the commercial and industrial entries were: Paul C. Mehnert, Cleveland, Ohio, consulting engineer; J. Byers Hays, Cleveland architect; and Prof. E. M. Strong, of Cor-nell University's School of Electrical Engineering. J. M. Ketch, illuminating engineer, represented General Electric as technical adviser.

In the residential lighting competition the judges were: Caroline E.

Horn, Electrical Testing Laboratories, Inc., New York, N. Y.; Gladys Miller, interior designer, New York, N. Y.; Gladys A. Branegan, director, Ohio State University's School of Home Economics, Columbus, Ohio; and Thomas Smith Kelly, lighting consultant, New York, N. Y. Technical adviser to this group was Eugene W. Commery, head of the G. E. residential lighting section, Cleveland, Ohio.

#### W. F. Little Named I.E.S. Medalist

William F. Little has been named by the Illuminating Engineering Society to receive its 1950 Gold Medal, Presentation will be made at ceremonies during the IES National Technical Conference at Pasadena, Calif., August 21-25. The IES Gold Medal, highest honor in the field of illumination, is awarded "for meritorious achievement conspicuously furthering the profession, art or knowledge of illuminating engineering.

Mr, Little, now Engineer in Charge, Photometric Department, Electrical Testing Laboratories, Inc., New York, has been identified with the lighting field since 1903 and has been active in the Society for more than a quarter century. He has served the Society as President, Vice-President, Treasurer and Director as well as chairman and member of a long list of technical committees.

Best known of Mr. Little's contributions to lighting progress has been his original work in photometry contributing basic knowledge toward the development of standard specifications for motor vehicles lighting, industrial, commercial, motion picture and natural lighting, among many others. In 1944 he became one of the first ten to receive the Society's grade of "Fellow" and was the first Chairman of



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the Board of Fellows. He is the author of several papers relating to the subject of photometry and illumination.

Mr. Little is also a member of the Society of Motion Picture Engineers, Optical Society of America, Inter-Society Color Council and Society of Automotive Engineers.

#### IAEI Appoints Technical Assistant

Latest addition to the headquarters staff of the International Association of Electrical Inspectors in Chicago is Robert A. Peterson of Detroit, Michigan. By action of the IAEI Executive Council, Mr. Peterson was recently appointed Technical Assistant Secretary to the International Secretary-Treasurer, Charles L. Smith.

Mr. Peterson brings to his new position a wide and varied experience in the electrical industry. For seven years he was employed by the Snyder Tool and Engineering Company in maintenance, construction and installation of electrical machines and tools. For two years he was electrical field service representative for this company, servicing machines supplied to the automotive and aircraft industries. Later, he was employed by several Detroit area electrical contractors doing industrial installations.

During the war, Mr. Peterson served with the U. S. Navy as a radio technician and later as an instructor training naval personnel in radar and sonar installations in the advanced phases of the program.

Following honorable discharge from the Navy, he was employed by the City of Detroit as an electrical inspector for the Department of Buildings and Safety Engineering. On the basis of a Civil Service Examination, Mr. Peterson was advanced to Assistant Electrical Engineer—a position he



ROBERT A. PETERSON

filled for approximately two years. His duties with the Electrical Inspection Bureau of Detroit included supervision of field inspectors covering industrial and large commercial instal-

Mr. Peterson's formal technical education includes study at the Cass Technical School of Detroit, Lawrence Technical Institute College of Engineering, and-following the War -the Detroit Institute of Technology where he worked evenings toward a B.S. degree in electrical engineering. While in Chicago, Mr. Peterson expects to complete the remainder of his studies for a degree at the University of Illinois.

#### **Book Reviews**

#### Heating

"Radio-Frequency Heating Equipment" by L. L. Langton deals mainly with the generation and transfer of radio-frequency power, in a manner suited to the needs of those having an interest in radio-frequency heating. The book discusses the design of equipment in this field, touching on the applications of various heating techniques. Chapters are devoted to a historical introduction, dielectrics, heating by eddy-currents, thermionic generators, dielectric-heating work circuits, power supplies, applications and properties. The test, covering 196 pages, is illustrated by diagrams, sketches, formulae, charts and tables. A complete index of subject matter is found at the back of this 5½-by-8½-inch book which is published by the Pitman Publishing Company, an princed at \$3.75 in New York, Toronto and London.

#### **Electron Tubes**

A new college text book, "Electron-Tube Circuits" by Samuel Seely, professor of Electrical Engineering at University, joins the Syracuse McGraw-Hill Electrical and Electronic Engineering Series. About half of the material in the book pertains to radioengineering, while the remainder is divided between the radar, television, pulse communication and general electronic control. The book seeks to provide a clear analytical method in the study of electron-tube circuits, to present and study the various classes of circuits which find application in the popular fields of today's scientific advances, and to indicate with examples how to combine circuits of the various types to achieve either a single or a combination of operations.

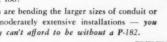
### BEND PIPE WITH MOTORIZED **HYDRAULIC POWER**



#### This low-cost, portable, electrically-driven hydraulic pump can TRIPLE your output!

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The book is prepared for high-level study and it is considerably more complex than a general text normally attempts. Included in the volume are discussions on the electronic tube characteristics, basic amplifier principles, oscillators and rectifiers, amplitude modulation, sweep generators, electronic instruments and an appendix including plate characteristics of receiving-type tubes and transmitting tubes, and Bessel functions of the First Kind. Text is augmented and illustrated by diagrams, formulae, charts and tables. Containing 530 pages and priced at \$5.50, the book measures 6 by 9 inches, is bound in a stiff black binder with red and gold printing, and is published by the McGraw-Hill Book Company, 330 West 42nd St., New York 18, N. Y.

#### Industrial Electronics

Interest in electronics is rapidly increasing for, during the past few decades, the electron has grown from something scarcely more than a hypothesis to perhaps the most powerful force in all the world, playing a significant part in nearly every branch of human endeavor. From the color grading of beans to the measurement of red-hit steel, electronics plays a vital role. For those who have a good knowledge of general physics and engineering but who have had little training or experience in electronics, therefore, "Industrial Electronics" by Andrew W. Kramer, Editor Power Generation, should be of interest.



A FLAIR FOR developing costcutting gadgets for motor repair work is characteristic of (L to R) T. A. Heermans and Edgar Foote, partners of F & H Electric Company, Dallas, Texas motor service shop. With 58 years of repair experience between them, the two have been together for five years; in a new building for past two years.

#### RELIANCE TIME SWITCHES





HUGH S. GUNN, electrical contractor of Rutherford, N. J., is active in both business and civic circles; is a member of the local chamber of Commerce and two Electrical Leagues (Bergen and Passaic).

This is a practical and basic beginner's book, explaining in simple language and without the use of mathematics, what electron tubes are, how they work, how they evolved and how they are used. Beginning with a brief historical background it proceeds to a discussion of fundamental principles of the electron tube, placing emphasis on the diode as the basis for more complex tubes in industrial use.

Sketches, diagrams and charts illustrate the text which occupies 311 pages measuring 6-by-9 inches. Priced at \$6.00, the book is published by the Pitman Publishing Corp.. New York.

### Machinery

The third revised edition of "Electrical Machinery" by Fred A. Annett. associate editor of Power, includes a wealth of specific material on electron tubes and the circuits in which they are used as well as material not available at the time of former printings. The installation, operation and maintenance of electrical machinery is the general theme and, starting with magnetism, the properties of permanent and electro magnets and electric circuits, it continues to the application of these fundamental principles and demonstrates how theory and practice are related. Electrical instruments and meters are also discussed as to construction and application, while the different types of a-c and d-c motors and generators are analyzed. Twoand 3-phase circuits, the use of alternators in parallel, power factor, transformers and electronics are explained in a practical, easily understood manner. Diagrams are used extensively for illustration purposes and a complete index makes reference chores simple. Priced at \$6.00, the book in-



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Socket with meter in place is sealed against the elements

cludes 460 pages, sized 6 by 9 inches, bound in a stiff green gold-lettered cover. It is published by the McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y.

#### **Edward Weston**

"A Measure for Greatness" by David O. Woodbury, former news editor of Power, presents a vivid account of the life and times of Edward Weston, the famous inventor and the founder of the Weston Electrical li. strument Company. The book is a chronological record of Weston's inventions, cast against a background of the general development of the electrical-instrument field. Illustrated by diagrams of many inventions and pen-andink drawings of historic events and scenes, the book is priced at \$4,00, measures 6-by-9 inches, includes 230 pages, is bound in maroon fabricoid and is published by the McGraw-Hill Book Company, Inc., New York, Toronto and London.

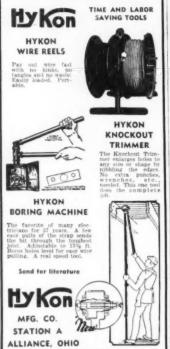
## Rigging

A "Handbook of Rigging", covering everything important concerning slings, ladders, cranks, hoists and derricks used for erecting structures of various sizes, handling heavy machinery and performing everyday maintenance operations in industrial plants, power plants and factories, has been prepared by W. E. Rossnagel, Safety engineer for the Consolidated Edison Company of New York. The book is



AT PREVIEW OF three-dimensional color projections - Curtis Lighting's new lighting sales toolare: (L to R) J. Walter Collins, manager, Electrical Contractors Association of City of Chicago; Charles E. Johnson, Chicago Sales manager, Curtis Lighting, Inc.; Herbert Binner, executive secretary, Cook County Electrical Contractors Association; and Ray Ashly, technical director, NECA Research Committee.

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ELECTRICAL SAFETY is the daily responsibility of chief electrical inspectors (L to R) Charles P. Dahncke, Wilmette, Ill.; J. Gordon Maltby, Evanston, Ill.; and Harry Madson of Winnetka, Illinois.

confined to technical phases of rigging, ranging from data on fiber and wire rope, hoisting chains and hooks, the testing of scaffold planks and calculating the strength of timbers to recommended maintenance techniques for steel stacks, painting in high places and accident prevention. Laws and standards governing the use of rigging, hoist signals, first aid to the injured and time-tested rigging methods make the book particularly useful to electricians, maintenance men and builders. Included in the book are data on wire rope installations useful to designers of small cranes, high-lift trucks and modern material-handling equipment. Loads and strengths can be calculated quickly by applying the various formulae or referring to the numerous charts and tables. Photographs, diagrams, sketches of equipment in use, samples of recommended safety campaigns, a mathematical appendix and a cross-referenced index contribute to the usefulness of this volume priced at \$4.75 and published by the McGraw-Hill Book Company, 330 W 42nd St., New York 18, N. Y.

## Dates Ahead

National Fire Protection Association—54th Annual Meeting, Haddon Hall, Atlantic City, N. J., May 15-18.
National Industrial Service Asso.—Annual Service Association of Electrical Distributors—Annual convention, Atlantic City, N. J., June 12-16.
New York State Association of Electrical Distributors—Annual convention, Hotel City, N. J., June 12-16.
New York State Association of Electrical Contractors & Dealers, Inc.—Saranac Inn, Saranac Lake, N. Y., July 1-8.
International Municipal Signal Asso.—55th Annual convention, Hotel Commodian Electrical Manufacturers, Asso.—Annual meeting, General Brock Hotel, Niagara Falls, Ont., Sept. 27-29.
National Electrical Contractors Association—Annual convention, Hotel Biltmore, Los Angeles, Califf., Oct. 17-20.
National Electrical Manufacturers Association—Chalfonte-Haddon, Hall, Atlantic City, N. J., Nov. 13-16.





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## **Manufacturers News**

Wagner Electric Corporation, St. Louis, Mo., at a recent meeting of its stockholders, elected P. B. Postlethwaite to the newly created office of Chairman of the Board. He will continue as chairman of the executive committee.

J. H. Devor, who has been vice president since 1941, was elected president. H. N. Felton, manager of the St. Louis sales branch, was elected vice president in charge of sales. L. W. McBride, credit manager, was elected assistant secretary-treasurer to succeed A. K. Bahret, who has retired.

A. H. Timmerman, vice president and director, has retired and G. A. Waters, vice president in charge of manufacturing, was elected director to fill the vacancy created by Mr. Timmerman's retirement.

Westinghouse Electric Supply Company has announced the appointment of Fred B. Hickman as manager of the Savannah branch. He formerly served as an apparatus salesman for the same Wesco House.

R. H. Elliott, former Wesco Middle Atlantic District apparatus and supply sales manager, has been appointed Southern California District apparatus and supply manager, replacing G. I. Hicks, who becomes district stores manager.

D. H. Keet, former Southern California district stores manager, has been assigned to the duties of assistant district service manager at the Vernon branch.

General Electric Co., Schenectady, N. Y., has announced the appointment of P. A. McTerney as administrative assistant to J. M. Crawford, manager of G.E.'s large motor and generator divisions.

S. V. Travis has assumed Mr. McTerney's former responsibilities as manager of sales for the large motor and generator divisions. L. H. Matthes has been named assistant manager of sales for the divisions.

General Electric's newest and twelfth Apparatus Department sales district, established March 1 with headquarters at St. Louis, will be known as the Mid-States District.

Tomic Sales and Engineering Company, Detroit, has announced the appointment of the following representatives: Hopper & McCoy, Atlanta, Ga., covering Georgia, Alabama, Florida, North and South Carolina and Eastern Tennessee; William E. Jobes, Indianapolis, Ind., covering Indiana and Kentucky; Southland Sales Agents, Memphis, Tenn., covering Arkansas and Western Tennessee; and Hutson Colcock, New Orleans, La., covering Louisiana and Miss.

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## Sherman Bronze FIXTURE CONNECTORS

These high quality fixture connectors have a secure, positive gripping action that assures lasting tight connections. Particularly desirable for commercial and industrial installations, because they won't heat, won't vibrate loose. Non-removable screws, divided wall, wedge lock. Connect all wires up to No. 12. either end. Write for sample.

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Battle Creek, Michigan

The Mighty "MIDGET"

Small, simple, connector that hold wires securely by positive snubbing action of screw. Easy to install easy to tape—low in cost.



Allia-Chalmers, Milwaukee, has named Otho V. Tally as manager of the Midwest region, succeeding Benjamin F. Bilsland, who is retiring after more than 30 years of service. Mr. Tally, whose headquarters are in Chicago, was formerly manager of the St. Louis district. He is succeeded there by Baldwin G. Witty, formerly a sales representative in the company's Chicago office.

Chester W. Schweers, manager of Los Angeles district, has been named manager of the company's New England region with headquarters in Boston. He succeeds W. F. Tayor, re-

igned

R. D. Moody, manager of San Francisco district, has been appointed manager of the Los Angeles district, succeeding C. W. Schweers. Mr. Moody is succeeded as San Francisco manager by James A. Longley, Jr., who has been a sales representative in that office.

Graybar Electric Company, Inc., New York, has announced the appointment of N. M. White, Philadelphia district operating manager. He succeeds D. J. Hannan, who has retired.

A. C. Wehman has been appointed Minneapolis district operating manager. He succeeds W. G. Aasgard. Appointment of W. E. Haynes, Dal-

Appointment of W. E. Haynes, Dallas district operating manager has been announced.

Raymond C. Dunn has been named manager, Rural Lines Department, with headquarters in Chicago. Mr. Dunn formerly was manager, Outside Construction Sales for Graybar at Cincinnati. He succeeds George Vana who is retiring after 34 years of service with the company.

Slater Electric Company, Inc., of Woodside, N. Y., has announced the appointment of Jack E. Olson as assistant to the president. Mr. Olson was formerly associated with the Plastic Wire and Cable Corp. of Jewett City, Conn.

Charles R. Reitner has been named sales engineer. He was formerly a salesman covering the territory of Northern New Jersey. The territory of Metropolitan New York and Northern New Jersey will be covered by Thea and Schoen, Inc., New York.

Rockbestos Products Corporation has opened a new district office in New Orleans, La. This office will be responsible for the states of Louisiana, Texas, Mississippi, Alabama, Georgia and Florida. Warren S. Jones has been appointed district manager of the new office. He was formerly in charge of the Glendale, Calif., office.

Howard G. Jones will replace Warren Jones in the Glendale office.

Syntron Company, Homer City, Pa., has moved its New York sales and engineering office from Long Island City to 1860 Broadway, New York.



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"Prest-O-Lite" 5-in-1 Outfit . . . . \$22.50

## Since I Changed to This Outfit

Here's the way I figure it. I used to pump, prime, and generate before I could start work. Now I just turn a valve and flick a lighter. I get full heat instantly and save 5 to 10 minutes every time I light up. That's worth money...enough to work my new "Prest-O-Lite" Outfit for 54 minutes on an average job! By the end of a day, time saved this way has paid for all the "Prest-O-Lite" Acetylene I've burned.

What's more, my 5-in-1 Outflit handles easily and always gives me the exact flame and heat I want. So jobs go faster, too. I figure this extra time saved pays for my solder and flux. This way, soldering doesn't cost me a cent!

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#### FLEXIBLE CABLE CLAMP LUGS



Two or four bolts, designed to meet requirements where a single lug adequately applies to several size conductors.

Cover range of wire sizes from 1-1/0 to 2,000,000 CM solid or stranded.

PRESSURE TYPE CAST CLAMP TERMINAL LUGS



tact surface equal to ca-

pacity of wire. All contact surfaces ground, faces parallel, wire sockets machined. Wire sizes 1 to 2,000,000CM.

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National Electric Products Corp., Pittsburgh, has named Robert C. Bennett, Jr., as the new vice president and sales manager. He was also named a member of the company's board of directors. Mr. Bennett has taken over the responsibilities of Harold J. Newton, recenty retired.

Louis F. Weyand of Detroit, vice president in charge of the Minnesota Mining & Manufacturing Co.'s adhesives and coatings division, has been elected to the firm's board of directors.

Charles M. King, former assistant treasurer and assistant secretary, has been named treasurer. He will continue as assistant secretary.

George H. Schoettly and Edwin H. Church are new assistant treasurers.

The Advance Transformer Company of Chicago has announced the appointment of Ray J. Noel Company as West Coast representative with offices in Los Angeles, Calif.

The Burlington Instrument Company, Burlington, Iowa, has announced the appointment of the White Sales Company, Boston, Mass., as representative in the entire New England territory.

Electric Products Company, Cleveland, Ohio, has announced the appointment of E. G. Schroeder as sales manager. He was previously field sales manager.

Sheldon Storer and Associates of Cincinnati have been named as district representatives for the southwestern section of Ohio and the State of Kentucky.

John A. Roebling's Sons Company, Trenton, N. J., has announced the appointment of Walter A. Huber as general manager of the Wire Rope Division. For the past nine years, he has served as manager of preformed wire rope sales for the American Chain and Cable Co., Inc.

Westinghouse Electric Corporation has named Herman R. Larson as eastern district manager of the Company's Manufacturing and Repair department. He replaces L. D. Canfield, who has retired after more than 40 years with the company.

Webster Electric Company, Racine, Wis., has announced the appointment of D. Y. Robinson as representative in New York for the company's sound division.

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D. W. Onan & Sons, Inc., Minneapolis, Minn., has named Richard Goff of Atlanta, Ga., as direct factory sales representative covering the southern states of Alabama, Arkansas, Florida, Georgia, Mississippi, South Carolina and Tennessee.

Gould Storage Battery Corporation, Trenton, N. J., has announced the appointment of F. A. Miller as Northeast Regional Manager and the advancement of Mal Janis to the post of New York district manager, the position formerly held by Mr. Miller.

Williamson & Wilmer, Richmond, Va., has been appointed a sales representative for the Kuhlman Electric Company, Bay City, Michigan, in the State of Virginia and portions of North Carolina and South Carolina.

The Okonite Company, Passaic, N. J., has announced that E. H. McNeill, formerly assistant manager of the Chicago district has been appointed manager of utility and industrial sales for the company's entire middle-west territory, which extends from the Indiana-Ohio line to the Rocky Mountains

James M. Blacklidge, formerly vice president of the Standard Transformer Corp., Chicago, has purchased the controlling interest in the Gramer Company, Chicago, and taken over the duties of president, succeeding Everett E. Gramer.

Fairbanks, Morse & Co., Chicago, has elected Robert H. Morse, Jr., to the presidency. He has been vice president in charge of operations.

Two new vice presidents were also elected. They are O. O. Lewis, vice president in charge of sales, and F. J. Heaslip, vice president in charge of purchases and traffic.

Heinemann Electric Company, Trenton, N. J., has appointed George R. Horne & Company, Dearborn, Mich., as representative covering the Michigan territory, consisting of the lower peninsula of Michigan except the county of Berrien.

General Switch Corp., Brooklyn, N. Y., has named Electric Sales Company, Kansas City, Mo., as sales representative covering the area of western Missouri, northwestern Oklahoma, southwestern Iowa and the states of Kansas and Nebraska.

Burndy Engineering Co., Inc., New York, has appointed Dr. George H. Zirker as chief metallurgist.





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QUALITY REWINDS
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electrical contracting and sales branches. The transfer will naturally allow the motor repair shop to spread out, and preliminary changes are already in progress for rearranging the overhead monorail system for material handling, for relocating the single-phase department on a production-line pattern, for shifting partitions for a more useful allocation of space, and for effecting other improvements in the shipping, dip-bake and general repair sections.

Not all of New England's repair activities are confined to the shop, for although the company does not seek maintenance contracts, many plants in the area subscribe to the policy of having all electrical equipment checked, cleaned and repaired each year during the summer vacation periods. On these occasions, all motors are checked for grounds and bearing trouble, equipment is thoroughly cleaned by vacuum and blowers, and windings are revarnished. When maior repairs are advisable, motors are taken out, repaired in the shop, and reinstalled. One jewelry company in the area, with 20 motors ranging up to 35-hp, in capacity, has followed this annual policy for 24 years-and the jewelry company is just one of many with the same approach to the maintenance problem.

Just as practical techniques have been developed for the shop, many helpful methods have been found for facilitating field work. For example, shorted coils on large motors can be quickly located by applying the principle of tone detection, using a standard transformer tester, probes and earphones. As probes approach a shorted coil and resistance is decreased, volume and pitch of the characteristic hum decreases. When the faulty coil is finally reached, the sound ceases entirely, thus spotting the short and saving considerable testing time.

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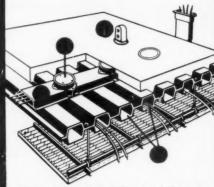
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